

**ENVIRONMENTAL ASSESSMENT FOR
Hart Prairie Restoration
Restoration of High Elevation Riparian Community
(Bebb Willow Restoration)
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE, SOUTHWESTERN REGION
COCONINO NATIONAL FOREST
PEAKS RANGER DISTRICT
Coconino County**

An interdisciplinary Team (Team) of Forest Service resource specialists was selected and formally initialized by the Peaks District Ranger on May 25th, 2000. The Team members were selected based on anticipated issues and resource concerns for the Hart Prairie Habitat Restoration Project Area. The Purpose and Need section of this Environmental Assessment (EA) describes why the Forest Service wants to take action in this area at this time. This (EA) also summarizes the team's evaluation of existing uses and resource conditions and comparison to desired conditions set forth in the Forest Plan. Where differences were seen, the Team set objectives for moving toward desired conditions and listed appropriate actions for meeting the objectives. A group of actions was presented to the public as the Proposed Action. The Proposed Action was retained as Alternative A, and subsequent alternatives were developed in response to issues raised in response to the Proposed Action. A comparison of alternatives based on the issues and a summary of environmental effects of the alternatives are displayed here. All the information brought forth during this analysis process was used to choose a preferred alternative.

The map that follows shows the general location of the project area located 12 miles northwest of Flagstaff, Arizona near Forest Road 151.

1.0 PROJECT SCOPE

1.1 Background

An informal partnership exists between The Nature Conservancy (TNC), Northern Arizona University (NAU) and the Forest Service (FS) to restore ecological function to a high elevation riparian plant community located in Hart Prairie, approximately 12 miles northwest of Flagstaff, at the base of the San Francisco Peaks.

Over the past five years, there has been an integrated adaptive approach to improve ecosystem conditions at Hart Prairie. A first focus was on identifying, ranking and modeling all of the individual factors that affect the health of this high elevation Bebb willow-wet meadow community, and then prioritizing which factors could be modified or restored. By adaptive we mean that ecosystem responses to management activities have been monitored intensively and extensively (primarily by partners at NAU),

so that we can refine our ecological model of how the system works, and we can refine our management approaches to make them as effective as possible in restoring ecological function to the system.

NAU, TNC and FS personnel conducted resource inventories over multiple years. Complete data documentation for each activity is located in files maintained by the department responsible for that resource. Summaries of the data collected and all documentation of alternative development are located in the Project Record File maintained at the Peaks District office.

1.2 Purpose and Need

The Forest Service is charged with managing ecosystems that function for future generations. There is adequate research and knowledge available to show us what actions should be tried in reversing deleterious trends.

One topic has been an understanding of ‘structural’ approaches, primarily focused on restoring channel morphology to original topography to improve surface and subsurface water movement into the system, and also on protecting sensitive areas of natural regeneration or ‘willow nurseries’ around springs and seeps by fencing out mule deer and Rocky Mountain elk from browsing young plants.

The longer term, nonstructural approach has focused on returning natural fire to this fire-adapted system to restore nutrient cycling and plant community succession dynamics. One hundred years of fire exclusion has led to excessive fuels accumulation and densely-stocked forests, as well as encroachment of meadows by conifer tree species. By removing trees through prescribed burning in the upland watershed above the Bebb willow-wet meadow community, the hydrological model indicates a resulting increase in surface and groundwater water yield, and a slowing of the pulse of water to possibly coincide with seasonal seed rain, increasing the probability of a more widespread regeneration event for the willow and other associated riparian species. Conifer removal through manual harvest (or thinning) and prescribed burning will improve watershed function through conifer tree root replacement by grass species, which have been shown to increase infiltration at the soil surface, store more water in their fibrous root systems, and lose less water to interception and sublimation of snow.

In summary, the following statements explain why this project is being considered at this time.

Action 1 (burning) is considered in order

- to use fire to stem the encroachment of woody tree species which increases water use in the area upslope of the riparian community.
- to have a higher level of infiltration of precipitation into the shallow perched aquifer that supports this riparian community.
- to increase surface water flows during the time period when willow seed is disseminated so regeneration increases.
- to increase vigor of grasses, forbs and shrub understory and improve nutritional quality of forage for deer, elk and turkey.
- to improve quality for scarlet gilia, a fire dependent wildflower that is an important food resource for hummingbirds, insects and deer.

Action 2 (thinning) is considered in order

- to remove those trees upstream and in the same watershed as Bebb willow, focusing on meadow invasion by ponderosa and southwestern white pine.
- to have a higher level of infiltration of precipitation into the shallow perched aquifer that supports this riparian community by decreasing transpiration by removing woody vegetation
- to increase surface water flows during the time period when willow seed is dispersed so regeneration increases.
- to protect soil structure and function by using lop and scatter slash disposal treatment methods.
- to design thinning activities based on baseline vegetation data collected on site, local hydrologic monitoring data and computer visualizations.

Action 3- (removal or modification of tanks) is considered in order

- to have a higher level of infiltration of precipitation into the shallow perched aquifer that supports this riparian community by decreasing the number of surface water diversions-
- to increase surface water flows during the time period when willow seed is disseminated so regeneration increases.
- to have less disruption of water flow
- to return surface flow to stream channels below these tanks where it is currently retained or diverted.

Action 4 (monitoring) is considered in order

- to evaluate to what degree tree removal, burning and tank removal upslope of the Bebb willow community improves increased ground water flow into or through the Bebb willow community.
- to verify that changes in ground water flow have the desired effect of improving conditions for both Bebb willow establishment and recruitment

What is our direction from the Forest Plan?

The Bebb willow community is located in the 170 acre Fern Mountain Botanical Area where the high elevation riparian scrub community dominated by Bebb willow, represents a unique riparian community. In the Plan it states that the “botanical areas and geological area are managed to maintain, as nearly as possible, existing conditions and natural processes for public enjoyment, demonstration, and study. Interpretive and educational demonstration opportunities are emphasized and enhanced through selective facility development. [The consequences of] natural events are not rehabilitated. Off-road driving is prohibited.”

Areas in the uplands above the Botanical Area fall within Management Area 3 (ponderosa pine and mixed conifer less than 40% slope) and Management Area 9 (Mountain Grassland).

In MA9 the plan emphasizes “livestock grazing, visual quality, and wildlife habitat. Other resources are managed in harmony with emphasized resources.”

“Maintain existing mountain meadows by removing invading overstory by cutting or other methods, gully stabilization to raise the water table, soil scarification, and seeding with appropriate grass and forage species”

“Manage mountain grasslands to achieve 90 percent of potential ground cover to prevent accelerated surface erosion and gully formation. ...”

Plan and implement cost effective stream channel restoration projects to raise the water table in meadow areas where channel erosion has resulted in a lowering of the water table.

Fire management for Management Area 9, Mountain Grassland, emphasizes:

- A suppression objective of less than 100 acres. Choose a suppression method that minimizes the damage to resources.
- Prescribed fire using planned and unplanned ignitions can be used to accomplish resource objectives.

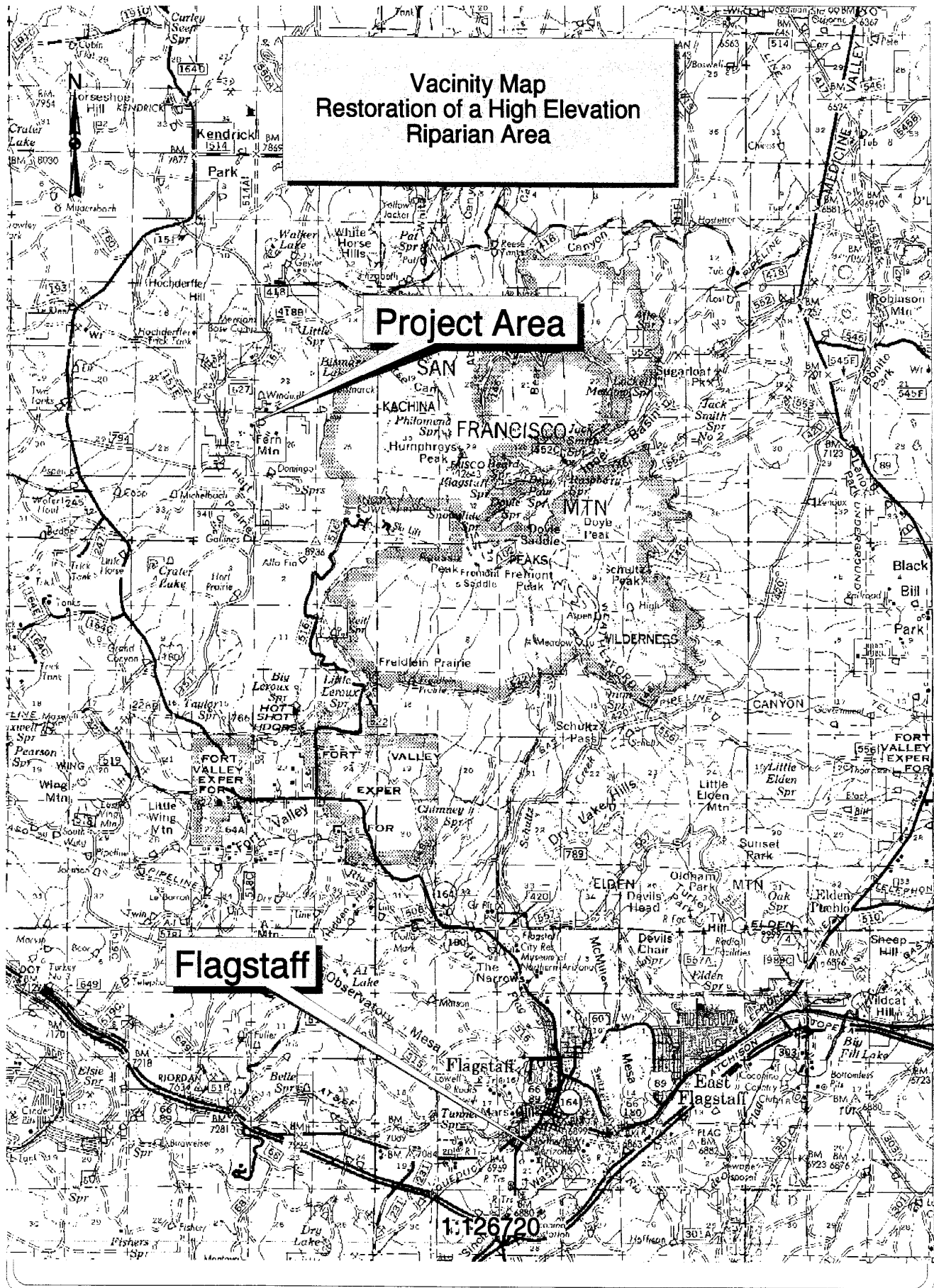
Fire management recommendations for Management Area 3, Ponderosa Pine and Mixed Conifer on less than 40% Slopes, include:

- Suppression objective is 100 acres or less.
- Prescribed fire using planned and unplanned ignitions is used to meet resource objectives.
- Unplanned ignitions are not used as a management tool in the urban interface. Annual average wildfire acreage burned should not exceed 750 acres per year on the average over a 10-year period.

1.3 Project Location and Analysis Area

On Hart Prairie on the San Francisco Peaks near The Nature Conservancy property near Fern Mountain, in Coconino County, along Forest Road 151, approximately 10 miles north, northwest of Flagstaff. T23N, R6E, sections 26 and 25.

The map that follows describes the general location of the project area.



1.4 Decision To Be Made

The District Ranger, Peaks District of the Coconino National Forest, is the official responsible for deciding whether or not to apply prairie restoration projects and if so, what combination of activities will be applied.

1.5 Proposed Action

To begin restoring the prairie ecosystem previously outlined, a Proposed Action was crafted by the Team. One mailing occurred on July 29, 2000 and a second mailing occurred on September 5, 2000. The second mailing was to addresses of new landowners in the area that were not included in the first mailing. This project was listed in the Schedule of Proposed Actions of the Coconino National Forest which was mailed to over 500 addresses on February 10, 2000 and subsequent editions. A number of actions including tree thinning or removal, prescribed burning, channel stabilization, and dirt tank removal were described. Further public involvement included an Open House held by The Nature Conservancy in October, 2000. In addition, members of the Hopi tribe visited in the area and provided comments on the project.

The Proposed Action is described in detail under Alternative A.

1.6 Issues

15 letters or e-mails were received in response to the Proposed Action. The team read and considered all comments received. The actual comments and documentation of the team's review of comments is located in the Project Record (multiple entries).

The following summary discusses the comments received. Individual letters and additional notes about their review are located in the Project File (multiple entries). Many letters addressed multiple topics and comments so there are more comments listed below than there are total number of letters. Comments are in regular type and the disposition of comments is in italics.

General summary

Six comments expressed overall concern, apprehension or objection about the project. One comment supported thinning and tank removal but not prescribed burning. One letter provided no comment on the merits of the project, rather it only indicated that a 404 permit may be required. Three comments supported thinning and burning but not tank removal. Two comments were in full support of the project and an additional 2 comments were in support of project but requested burn plans and timeframes. One comment supported thinning but not tank removal or prescribed burning.

Detailed points of view

Seven comments expressed concern about a prescribed burn escaping onto private land, and five comments expressed concern about a prescribed fire escaping and burning up to the wilderness, Snowbowl ski area or the San Francisco Peaks.

Components of the burn plan will be added to the section of this EA called items common to all action alternatives. The effects of prescribed burning will be discussed in Chapter 3 of this EA. Alternative A provides for burning in the spring or fall. There is no burning under Alternative B, No Action. Alternative C addresses this concern further by conducting prescribed burning only in the spring. The team considered an option of thinning and no prescribed burning. This alternative was considered but dropped from further analysis as described in the following section of this EA.

Three comments mentioned the current spring that is piped to a 10,000 gallon metal tank for TNC use. TNC has water rights to a spring on national forest land. Some comments suggested that this pipe and tank be considered for removal.

TNC has legal rights to use the water and we understand that TNC makes every effort at conserving water. No alternatives relate to this spring.

Three commenters requested copies of burn plans, the timeframes of burning, and responsible officials

As stated above, many parts of the burn plan will be listed in the EA under items common to all action alternatives.

Two comments expressed concerns that this project interferes with natural processes. They say that trees have grown as part of a natural process and interfering is unnatural.

The current conditions are less than “natural” because of interrupted natural processes. An example of unnatural fire behavior was the recent Fort fire which burned hot and fast. The No action, Alternative B, will display the current situation. Effects of the action alternatives on the current situation are described in Chapter 3 of this EA.

One comment expressed concern that this project caters to a special interest, TNC.

This project is a partnership with TNC and NAU, however the benefits of the project are not just related to these two organizations. The benefits to National Forest land and the general public include re-establishing impaired prairie ecosystem, and restoring natural riparian processes. The benefit to the public of this partnership is the high quality and quantity monitoring accomplished by NAU and TNC personnel. No alternatives were created in response to this comment.

Two comments were concerned about the effect of the tree removal on elk and deer use of the area.

Six comments were worried that removing tanks will negatively effect wildlife, or cause them to go somewhere else. Many writers enjoy wildlife viewing in the vicinity of the tanks. Others asked about impacts to other water sources, especially during drought years. One letter mentioned that outdoor classroom children visit Snowbowl tank regularly.

*To clarify, under the proposed action Alternative A and Alternative C, the spillway of Snowbowl Tank will be modified slightly to redirect overflow into the original channel. The existing water capacity of the Snowbowl tank will **not** be reduced. The berm of Snowbowl tank will remain as is except in the vicinity of the spillway. Under the No Action Alternative B, the Snowbowl tank spillway would not be modified.*

The team considered the un-named tank and felt its removal was still desirable. This tank does not hold much water, is shallow and detracts from the visual quality of the prairie. Under both action Alternatives A and C the un-named tank will be removed and revegetated. Alternative B, no action would not changed the un-named tank.

The effects of tank changes are discussed in chapter 3 of this EA.

Two comments were worried about slash that lies around for a year or two, or piles that exist for a year or two, i.e. eyesores and fire hazards.

There are no slash piles planned for any alternative. Other slash treatment methods were considered, but not carried forward because they required heavy equipment. Common to the action alternatives, trees will be cut and left where they fall. The visual effects of these alternatives are discussed in Chapter 3 of this EA. There is no slash created under Alternative B, no action.

One comment was expressed that this project is too focused on a single species and not the ecosystem.

The effects including benefits to wildlife and plant species are discussed in chapter 3 of the EA.

Three comments stated the Forest Service can't fix the road because they say they don't have the resources, yet they can afford a project such as this.

The funding type for road maintenance is different than the funds used for this type of project. Maintenance of 151 is not directly linked to the objectives of this project.

Two comments expressed concern that enhanced grasses from prescribed burning will draw in elk and cause increased elk use of the Bebb willow plants.

Chapter 3 of this EA discusses the effects of the action alternatives on elk use. Currently, a large percentage of the Bebb willow are browsed by elk. It is unlikely this project will provide a major change in elk behavior in the area. The No action, Alternative B displays the current elk situation.

Three comments were concerned about the destruction of the aspen stand near Snowbowl tank

No thinning treatments will occur to aspen stands under any alternative. Spillway modification work will not affect the aspen trees.. There is prescribed burning proposed under Alternative A within the aspen stand. In response to this comment, Alternative C includes no prescribed fire within the aspen stand. The effects of burning on the aspen stand are discussed in Chapter 3 of this EA.

One letter from the Army Corps of Engineers stated that this activity may require a 404 permit.

Once a NEPA decision is made on a preferred course of action, a 404 permit will be applied for if necessary.

One comment expressed concern about the vegetation in the ravine below Snowbowl tank and urges the FS to plan carefully the changes in the water flow to maintain the tank and the associated ravine and its plant community for all to enjoy.

Under both alternatives A and C the spillway of Snowbowl tank would be re-routed so that when the tank overflows it will go into the channel (ravine). No earth-moving activities would occur in the ravine itself.

2.0 ALTERNATIVES

2.1 Alternatives Considered, But Eliminated From Detailed Study

Using prescribed fire without thinning was not developed as a distinct alternative for the entire project area, because it did not meet enough of the project objectives. Most studies indicate that prescribed fire alone is not effective in thinning trees to the sizes of those in the Hart Prairie project area. This is especially true because of the desire for the coolest, safest fire possible when snow still occurs in patches above the meadow. Prescribed fire alone does not substantially increase the amount of water flow, nor does prescribed fire alone substantially increase biodiversity in grasses, shrubs and forbs unless the canopy is opened enough to increase the amount of sunlight reaching the forest floor.

2.2 Alternative A -- (*Proposed Action*)

Actions described below will be implemented by FS, TNC or NAU personnel. When TNC or NAU personnel conduct activities they will be done according to FS standards and under FS supervision and inspection.

Actions

1. Prescribe burn 403 acres of grassland, aspen, mixed conifer and ponderosa pine. Approximately 78 acres will be on the south side of Fern Mountain. Prescribed burning on the Fern Mountain site will be divided into 3 to 4 small blocks to promote the fire dependant plant, scarlet gilia. The remaining 325 acres proposed for prescribed burning will be in the small watershed associated with Bebb willow. The prescribed burning in this area will have two entries over a 10-year period. In both areas, burning will be conducted during the spring, fall or winter depending on proper burning conditions. Fire lines will consist of hand and/or mechanized lines. Roads or natural features will be used as fire control lines when possible. Signs will be placed in nearby areas during burning to alert residents and visitors to the possibility of smoke and fire personnel and equipment.

On the Fern Mountain portion of the project the primary purpose of the burn is to return fire to a fire dependent ecosystem to perpetuate the plant, scarlet gilia and other fire dependent species. The desired effects for the Fern Mountain portion of the project includes applying a prescribed fire that generates low to moderate fire intensities and opens up 20 to 40% of the ground cover to bare mineral soil to provide a seed bed for scarlet gilia seeds.

The primary purpose of the treatment on Hart Prairie is to restore a degraded meadow by removing conifer encroachment and restoring natural processes so that the watershed has an opportunity to function more naturally to perpetuate such plants as the Bebb willow. More than 80% of the slash generated from the mechanical removal of small trees will be targeted with the first planned prescribed fire entry. Subsequent prescribed fires are scheduled to mimic the natural fire interval cycle to maintain the prairie. The desired effects for the Hart Prairie portion of the project include applying prescribed fire

that generates low to moderate intensities to reduce conifer encroachment and replicates the natural fire regime for the prairie. Scattered patches of bare mineral soil are desired to provide a seedbed for Bebb willow regeneration.

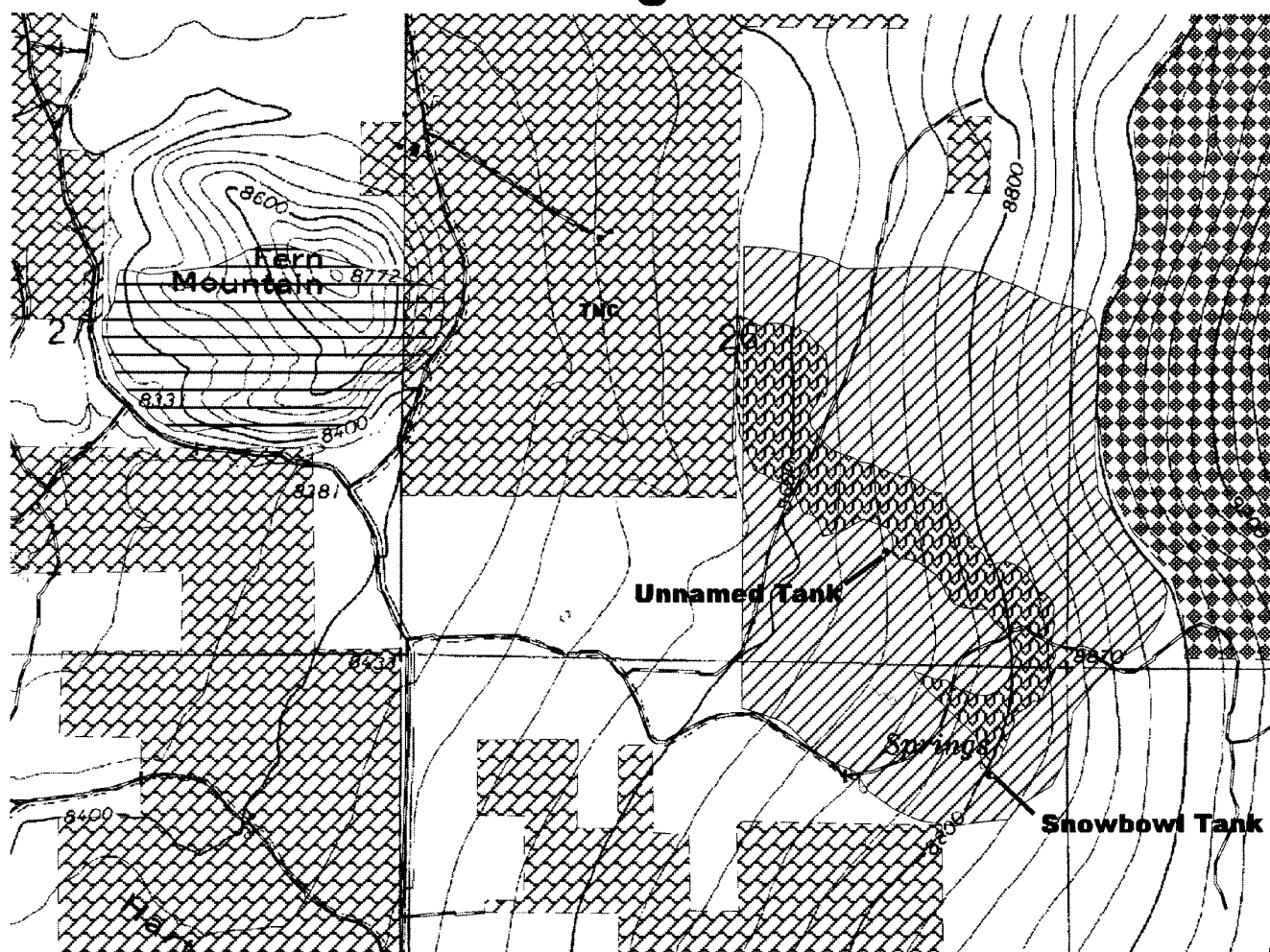
2. Reduce the density of scattered pines encroaching in the open meadow near the riparian community.

Removal of young ponderosa pine and southwestern white pine ≤ 6 inches diameter at breast height (dbh) on 325 acres will be done by hand crews and/or with an Agra-ax (mechanized shears). Within this 325 acres, larger non old growth ponderosa pine and southwestern white pine trees will be removed on 60 acres using a hand crew and/or an Agra-ax. Within the 60 acres, large trees (greater than 21") will be girdled or killed in a way to allow them to remain as snags. Within the 60 acre treatment area, for ponderosa pine, we estimate that 49% of the trees removed will be less than 6 inches diameter at breast height, 38% of the trees removed will be between 6" and 20" diameter, and 13% of the trees girdled will be 21" diameter or greater. For southwestern white pine, we estimate that 70% of the trees removed will be less than 6" diameter, 28% of the trees will be between 6" and 20" diameter, and 2% of the trees girdled will be 21" diameter or greater. Limbs, tops and trees will be lopped, scattered and left on the ground. Subsequent burning should remove much of this debris. Burning of the slash should take place as soon as the slash has cured and prescribed burning prescriptions can be met. This will usually be within the first year or two after cutting. Douglas fir and scattered Bristlecone pine will not be cut.

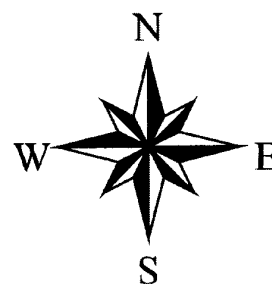
3. Remove an unnamed tank and modify the spillway on Snowbowl Tank. Under this alternative unnamed tank will be rehabilitated to adjacent landscape conditions. When work is complete it will no longer be a tank. The majority of the work on unnamed tank will be done in previously disturbed areas but may need to go outside the previously disturbed area somewhat. For Snowbowl Tank, the spillway will be modified slightly to redirect overflow into the original channel. The existing water capacity of Snowbowl tank will not be reduced. The berm of Snowbowl tank will remain as is except in the vicinity of the spillway. A variety of techniques will be used to accomplish the tank work including the use of a small bulldozer. Any disturbed areas will be re-vegetated using a native seed mix.

4. Monitor the ecological and hydrological impacts of restoration on the watershed and downstream riparian area. This will be done by Northern Arizona University and The Nature Conservancy.

Restoration of a High Elevation Prairie



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2.3 Alternative B (No Action Alternative)

The law requires the **No Action Alternative**. It is used as a baseline to measure effects if no changes to current trends are implemented. The no-action alternative is basically the status quo for the Project Area. This alternative takes no steps to change or alter the progression of conditions. In summary, all management currently ongoing in the area will remain the same.

2.4 Alternative C

In Alternative C, the prescribed fire prescription was modified to include late winter or early spring prescribed burning. Also included in the prescription were specific weather parameters that are required to be monitored before the prescription is implemented. Aspen stands will be excluded from the fire perimeter in Alternative C.

2.5 Items common to All Action Alternatives

The following items are common to all alternatives. The items related to burning are also located in the draft Burn plan.

Specific Objectives of the Burn

- Remove a minimum of 80% of the slash generated from the mechanical treatment of conifers on the Hart Prairie portion of the project.
- Remove as many as possible of the conifers less than 6 inches in diameter within the project areas on both portions of the project. 20 to 50% mortality is acceptable with fire but greater than 50% is preferred. Many of the trees may be removed mechanically.
- Maintain at least 95% of the wildlife snags identified within the prescribed fire perimeter.
- Keep fire off of all private land other than The Nature Conservancy.
- Maintain the initial prescribed fire treatment by mimicking the natural fire cycle and fire behavior by applying planned ignitions at least once per decade.

Range of Acceptable Results, Expressed in Quantifiable Terms:

- On Fern Mountain, open up 20 to 40% of the grass cover to bare mineral soil for scarlet gilia seed regeneration.
- On Fern Mountain, mortality in any of the few overstory trees is acceptable unless a tree has been specifically identified as a wildlife tree or for another reason.
- On Hart Prairie, up to 100% mortality of all of the conifers less than 6" diameter is acceptable. Realistically, with prescribed fire, the acceptable range of expected mortality is 20 to 50%.
- On Hart Prairie, mortality in trees over 6" diameter within the burn perimeter is acceptable unless trees are designated as old growth or wildlife trees. The loss of old growth or wildlife trees should be kept to less than 5% of the total number of these types of trees.
- On Hart Prairie, mortality to mature Bebb willow trees should be kept to less than 5% of the total number of trees within the burn perimeter. Mitigation actions to reduce the likelihood of mortality include pruning dead wood off of the trees, removing fuel accumulations from under the trees, excluding fire from under the trees with fire line or wet line or by using a low intensity backing fire under the trees.

- On Hart Prairie, 20 to 40% of the ground cover should be opened up to bare mineral soil to provide a seedbed for Bebb willow regeneration.

Preburn Considerations, On and Off Site:

Define line to be built, snags to be felled or protected, equipment to be pre-positioned, special features to be protected, warning signs to be placed, weather recording and monitoring needs. Knowledge and strong consideration shall be given to fuels and fuel loadings near and adjacent to the project boundary in combination with the topographic features. Knowledge and strong consideration shall also be given to long-term drought indicators such as lack of past year snow pack(s), long-term rainfall deficits, long range weather forecasts, consistently low fuel moistures, delay of green-up, and current issues such as approaching frontal systems, etc.

Special Considerations:

- Wildlife and designated old growth trees should be designated and protected as part of the pre-burn layout.
- Designated mature Bebb willow trees within the project area should be identified and protected from fire as part of the pre-burn layout.
- Utilize existing roads, closed roads, skid trails, and natural features as much as possible. Minimize the construction of handline and dozer line.
- Information signs should be placed in the project area before burning begins to notify forest visitors of the project. Warning and information signs should be placed on the main roads into the project area when burning begins. Consider going door to door to notify some of the residents in the area.
- If time allows, establish a 10-hour fuel stick location on a representative site near the season's planned ignition. Limited weather data is available from The Nature Conservancy and the Arizona Snow Bowl.

Wildlife, Wilderness Values, Soil and Watershed, Soil Moisture, Timber, Public Concerns, Private Land near or adjacent to the project, Archaeology, T&E, Wildland Urban Interface, Public Highways & Roads, High Voltage Transmission or Utility Lines, Pipelines, or Other Sensitive Features.

- Exclude all snags designated as wildlife trees and also designated old growth from the fire.
- Protect designated mature Bebb willow from fire by pruning, removing fuels from under the tree, excluding from fire or by using low intensity fire near or under the trees.
- The Burn Boss, Ignition Specialist and Holding Specialist will personally inspect the fire control line with a special emphasis on the control line located adjacent to private property to assure that the line is adequate.
- Some individual property owners have requested that they be notified before prescribed burning begins. Refer to the environmental assessment for the project for the names of the individuals and make an effort to contact them.
- The prescribed fire manager will review the cultural resource clearance recommendations before ignition begins to assure that all historic sites with burnable material have been identified and the appropriate mitigation measures have been completed. The archaeological clearance should be considered as part of this burn plan and its recommendations and requirements adhered to.

Plan for interagency and intra-agency pre-burn coordination and, where applicable, public involvement and burn-day notification to appropriate individuals, including adjacent landowners, land managers, agencies, high power transmission line contacts, utility companies, gas companies, oil companies, plus the general public.

- Every effort will be made to contact adjacent landowners via the news media, signs along the Hart Prairie Road, and door-to-door contacts.
- The District or Forest Information Officer will prepare a news release that will be circulated to the standard notification list of media, interested agencies and Forest Service frontliners.
- Personnel from The Nature Conservancy and Northern Arizona University are likely to participate during the implementation of this plan. All participants will meet all physical, red card and training requirements plus have full Personal Protective Equipment (PPE) and attend the Daily Briefing. Any media person or other visitor not qualified as a firefighter will have a firefighter as an escort and be issued full PPE.

Contingency Resources

- Contingency Plan for Going Out of Prescription at Low End: Complete day's ignition to a logical stopping point such as a road, trail or hand line. If that is not possible terminate ignition and construct line or mop up to stop further spread.
- Contingency Plan for Going Out of Prescription at High End: If it appears that the prescription will be exceeded on the high end, the RXB2 should consider completing what has been ignited to a logical control point such as a road, fire line or wet line. The two Type 6 engines can cool down the fire perimeter with a combination of water and foam.
- If prescription parameters are exceeded or anticipated to be exceeded, the following actions and contingency resources must be used to return the fire back into prescription. This must be accomplished within the 48-hour limit (FSM 5140.31): Every effort must be made to contain fire within the project boundaries. If prescription parameters are exceeded the RXB2 or Holding Boss will order resources needed to return the fire back into prescription from the Flagstaff Zone Dispatcher.

Historical/Cultural

The Forest Service has conducted a complete, intensive archaeological survey of the entire 403 acre proposed project area. One prehistoric archaeological site and several historic features were located. Consultations have been conducted with the 13 tribes for whom the San Francisco Peaks hold significance. A no-adverse effect determination was made for the project based upon results of archaeological survey and tribal consultations.

The Archaeological Clearance for the project documents the archaeological inventory, results of consultations with the Tribes, and compliance with the National Historic Preservation Act of 1966, as amended. The report contains site-specific protection measures for implementation, including monitoring requirements. For example, slash will be placed outside of the prehistoric and historic site boundaries, and the sites will be monitored during implementation.

Best Management Practices

The "most practical and effective means of controlling nonpoint pollution sources from forests and rangelands is through the development of preventive or mitigating land management practices, generally

referred to as Best Management Practices (BMP's)" (Intergovernmental Agreement between the State of Arizona and the USDA Forest Service, Southwestern Region). BMP's are a practice or a combination of practices that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources (logging, burning, road maintenance/construction, etc.) to a level compatible with water quality goals (FSH 2509.22). All projects will abide by Best Management Practices.

To maintain soil productivity, roughly 5 tons per acre of coarse woody debris (over 3" in diameter) will be left.

Noxious Weeds

Best Management Practices contained in the Three-forest Noxious Weeds Strategic Plan Working Guidelines (Phillips et al. 1998) will be implemented for this project under Alternatives A and C. Under Alternative B following the Three-forest Noxious Weeds Strategic Plan Working Guidelines, noxious weeds will be removed as personnel and funding permits, depending upon the noxious weed and seriousness of the threat.

Air Quality

The State of Arizona statutes divide jurisdiction over air pollution sources between the State and the counties. The State has exclusive jurisdiction over air pollution sources having potential total emissions of 75 or more tons per day (like smoke from controlled burns), but defer some jurisdiction to the counties. National Forest lands ordinarily would come under county air control pollution control districts. Consequently, the State (Arizona Department of Environmental Quality, ADEQ) has complete jurisdiction over air quality monitoring. The Forest Service operates burning under guidelines set forth in the State Implementation Plan as required by the Clean Air Act 1970 (amended 1977, 1990).

Monitoring

An aggressive monitoring program is currently underway and will continue in the Project area to study conditions before, during and after the project is implemented.

2.6 Preferred Alternative

In this environmental assessment the Forest Service's preferred alternative is Alternative C. Alternative C will best meet our purpose and need and project objectives. The spring burn has advantages over the fall burn. A spring burn helps ensure high moisture levels and cool burning conditions. A spring burn provides better plant response than a fall burn. The tree removal and prescribed fire activities described in alternative C will restore meadow conditions to a portion of the prairie and release some water into the Bebb willow community downslope. Because un-named tank holds little water, it is beneficial to restore this tank area to the natural landscape. The spillway modification of Snowbowl tank will ensure that when this tank overflows, water will travel into the original channel, adding water to the Bebb willow community downstream. The work at Snowbowl tank does not change the holding capacity or the nature of the area. Many people expressed interest in maintaining Snowbowl tank and surrounding vegetation. The measures described in the "Items Common to All Alternatives" section will be applied to Alternative C. These measures ensure a high quality project with high standards for safety during implementation.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter shows the present condition (i.e. affected environment) within the project area and the changes that can be expected from implementing the action alternatives or taking no action at this time. The no action alternative sets the environmental base line for comparing effects of the action alternatives.

The major issues define the scope of environmental concern for this analysis. The environmental effects (changes from present base line condition) that are described in this chapter reflect the identified major issues. Some of the environmental effects are confined to this action and the project area. Others are cumulative with environmental effects from other actions and cover an issue area beyond the project area. Cumulative effects are discussed for each major issue when they occur.

HISTORY

History of the area is described here in order to set the stage for the affected environment and environmental consequences.

Fire History of the project area.

Evidence suggests that fire regimes have changed dramatically in this area since settlement by Euro-Americans in the 1870s. Historical photographs of Hart Prairie from as early as the Wheeler Expedition in the 1870's clearly illustrate that Hart Prairie was a true prairie with only a few scattered large trees dotting the prairie.

With a normal fire regime in the Hart Prairie and Fern Mountain area, the natural fire regime interval would be expected to be about one fire every two to eight years. These fires were typically low intensity fires that burned the grass and underbrush but generally did little damage to the overstory ponderosa pine trees. The frequent fires in this prairie ecosystem were the primary natural event that kept the prairie as a prairie. Extensive scientific evidence gathered from the Fort Valley Experimental Forest and the ponderosa pine forests surrounding the San Francisco Peaks have clearly documented the long-term fire history for the past three centuries.

The fire regime for Bebb willow located in the wetter sites may have been slightly different than that for the upper prairie and surrounding ponderosa pine savanna. Because some of the willow grows in a wetter site than much of the surrounding area, fire spread may have stopped or burned with a much lower intensity than the surrounding area. Bebb willow is highly susceptible to rot so reconstructing the fire history of this small community on Hart Prairie would be difficult if not impossible. Based on long term climatic trends (1700 to 1960) and the fire history of the surrounding ponderosa pine, 14 severe fire years were recorded. It has been inferred that for the Bebb willow community, this could translate into a fire interval of approximately every 19 years.

The dramatic conversion of Hart Prairie from a prairie to a mixed conifer stand over the last century can primarily be attributed to domestic livestock grazing and the exclusion of the natural fire regime. The extensive grazing in the early twentieth century removed much of the grass that was the fuel for the frequent lightning fires that swept across the prairie. With the removal of the grass and the creation of bare mineral soil by domestic livestock, conifer seed that blew into the meadow became established. Without grass to carry a fire, fire could not thin the conifer seedlings that became established in the meadow. The end result is the unnatural number of large conifer trees that are in the “prairie” today. Adding somewhat to the disruption of this natural cycle of periodic natural fire was the fire suppression policy of full fire suppression during most of the twentieth century. Because of grazing practices and fire exclusion, the conversion of what were once prairies to forested stands has been noted throughout North America.

On the Fern Mountain portion of the project, the south aspect of Fern Mountain has retained much of the grassland/prairie ecosystem that it had before Euro-American settlement. As dry as the south aspect is, the natural fire interval for this area was probably in the historical range of the surrounding ponderosa pine forest, every two to eight years. Prescribed fire applied within this range would maintain the diversity and vigor of the plants that comprise this grassland/prairie ecosystem. The importance of fire to perpetuate the unique plant, scarlet gilia, that grows on Fern Mountain has been clearly documented.

History of People

A brief history of human occupation and use in and around Hart Prairie is included in order to provide information on how these uses have influenced this ecosystem through time. The story of human occupation begins with scant evidence of a late Paleoindian (8,000 B.P.) occupation that is represented by an Agate Basin-like style point from the Bismark Lake area. Later prehistoric uses of the area were primarily seasonal hunting, gathering, and processing activities as indicated by chipped stone scatters, occasional masonry structures, and occasional rock art. Much of this use is associated with permanent water sources such as springs. The high elevation of the area most likely precluded prehistoric agricultural use. The Hart Prairie area continues to be used by several Tribes for traditional gathering of plant, animal and mineral resources, as well as for ceremonial and other cultural uses.

Spanish explorers were the first Euro-Americans to observe the region around the San Francisco Peaks in Northern Arizona. The Spaniards did not settle or establish any missions in the area. Natural resource exploitation by Euro-Americans began with fur trappers and mountain men in the period between 1605 and 1850. Exploration of the region began in earnest after the United States acquired the territory in 1846. Numerous expeditions to the area occurred to gather information to support the westward expansion movement. Expeditions included the Lorenzo Sitgreaves expedition in 1851 to scout the navigability of the Little Colorado and Zuni Rivers; the Whipple expedition in 1853 spent 10 days exploring the region for the Pacific Railroad survey along the 35th parallel; and Lieutenant Edward F. Beale’s expeditions (1857, 1858, and 1859) for the purpose of scouting and constructing a wagon road along the 35th parallel from Fort Smith Arkansas to Los Angeles. Descriptions written by these explorers furnish us with information about what the area looked like. Beale’s description of the area in 1859 is a revealing picture of what the ecosystem looked like, “*The weather is delightful; no one could pass through this country without being struck by its picturesque and beautiful scenery, its rich soil, and*

its noble forests of timber...the soil is rich with black loam, the grass, grama and brush equally mixed, and the timber, pine of the finest quality and greatest size; water at this time we find everywhere..." Additionally the United States Geographic Surveys made by Wheeler between 1875 and 1889 have left us with a photographic record of the West side of the San Francisco Peaks, including Hart Prairie. Photographs of the Hart Prairie show a landscape dominated by prairie. The increase in the density of trees on the prairie is dramatic when these photos are compared to the landscape today.

The location of the railroad through the Flagstaff area was chosen in part because of the availability of raw materials for railroad ties. Construction of the railroad in 1881-1882 by the Atchison, Topeka, and Santa Fe (AT&SF) Railroad Company was a catalyst for growth and the associated resource exploitation to support such growth. The demand for railroad ties saw the arrival of a diverse group of laborers to harvest and produce them. Tie cutting began on the West side of the San Francisco Peaks in 1881, by a group of Mormons led by John Young. They were headquartered at Fort Moroni in Fort Valley.

The arrival of the railroad provided a means for shipping timber products, and served as a catalyst for the development of the timber industry. Logging railroads were constructed to access stands of timber in the area west of the Peaks including the Hart Prairie area; the wood harvested from this operation supplied the mill in Flagstaff. The beginning of livestock grazing also coincides with the arrival of the railroad. Grazing in the Hart Prairie area has been dominated by sheep, but cattle grazing has also occurred.

The creation of the U.S. Forest Service in 1905 consolidated forest administration, strengthened government control over timber harvesting, and marked the beginning of the fire suppression policy that has directly contributed to the present forest health conditions.

Euro-American settlement of the Hart Prairie area continued with the establishment of several homesteads. Use of this area by homesteaders has resulted in manipulations to the land on Hart Prairie such as constructed terraces, ditches, old fencelines, spring improvements, and even possibly plowed areas. Historic maps indicate that a dairy operation was patented on Hart Prairie in 1924, but was gone by 1934. Fern Mountain Ranch is a notable pioneer ranch that was established in 1890. This ranch played an important role in the development of the Grand Canyon as a tourist attraction. The ranch served as a relay station for the Santa Fe Railroad Company tourist stage line to the Grand Canyon. The Grand Canyon Stage Route runs through the Hart Prairie area. The San Francisco Peaks are a tourist attraction by virtue of their prominence and scenic beauty. Skiing is one of the recreational activities developed on the Peaks, and a lodge was constructed on upper Hart Prairie in the 1930's to further develop this industry.

Another enterprise that occurred in the Hart Prairie area was a scheme proposed by Charles Spencer in the 1910's to harvest water from the Peaks. He acquired water rights to springs and drainages, and developed elaborate plans for harvesting water through a series of ditches and tunnels that ran into Crater Lake, where water would be stored. His ambitious scheme was never completed, and his financial backers withdrew their support at the start of World War I. It has been determined that his developments were located to the south of the proposed project area.

The Hart Prairie region has been the subject of a great many scientific studies. Just north of the prairie at Little Spring in 1889 Dr. C. Hart Merriam located his base camp from which he conducted his two and a

half month long expedition to the San Francisco Peaks region. From the data collected on this expedition, Dr. Merriam formulated his life zone concept, a milestone in the emerging science of ecology. In subsequent years, a great number of scientific studies have been conducted on a wide variety of components of the ecosystem, ranging from butterfly and small mammal studies to hydrological studies. A number of these studies have involved installation of equipment, adding further man-made alterations to the terrain of Hart Prairie.

In conclusion, it is evident that in reviewing 8,000 years of human use and occupation of the Hart Prairie area that the human uses and management philosophies of the last hundred years have contributed a great deal to the current condition of the ecosystem of Hart Prairie.

Cumulative Actions

Cumulative actions are identified here as activities to be considered along with this project.

The Project Record File contains a copy of the Schedule of Proposed Actions (SOPA) and notes as to whether projects are considered connected to this project or not. There were two projects listed on the SOPA that should be considered along with the Hart Prairie Restoration Project.

Arizona Trail – Shultz Tank to Kelly Tank - A site specific proposal is not available to date.

Mineral withdrawal of the San Francisco Mountain/Mount Elden Area – The withdrawal includes this project area. Withdrawal does not effect the area directly but limits the potential effects of future mining in the area.

In addition, private land uses and development will continue in the area, according to County zoning rules and water rights law.

FIRE

This section and those that follow describe affected environment and environmental consequences for the Hart Prairie Restoration Project.

Short Term and Long Term Effects

In the short term with fire exclusion, expect the prairie to continue to slowly disappear as it converts to a mixed conifer stand. Over the long term with fire exclusion, the prairie will be replaced by a mixed conifer stand that will be highly susceptible to a crown fire. The diversity and vigor of plants that make up the prairie will be slowly lost.

In the short term with the reintroduction of fire, the number of conifer trees encroaching on Hart Prairie and Fern Mountain can be significantly reduced. Also, the establishment of even more conifer seedlings can be slowed to a more natural level. Without the competition from the conifers and with the

application of prescribed periodic fire or natural fire, the prairie will begin to achieve some ecological balance between forest and grassland. Over the long term with the reintroduction of fire, much of the prairie ecosystem could be reestablished. As researchers monitor the short-term effects of the treatments, the knowledge gained can be used to further promote prairie restoration.

Differences between Alternatives A, B and C for the Prescribed Fire Prescription

Alternative B is the “No Action” Alternative. Under this alternative no prescribed fire would be used. The conversion of the prairie to mixed conifer stands would continue.

Alternative A proposed prescribed burning as part of the treatment to restore Bebb willow and the prairie ecosystem. After reviewing the public comments, Alternative C was developed. In Alternative C, the prescribed fire prescription was modified to include only spring prescribed burning. Also included in the prescription were specific weather parameters that are required to be monitored before the prescription is implemented. Aspen stands will be excluded from the fire perimeter in Alternative C. Also, as a result of the public comments and the concern over the use of prescribed fire, a draft Bebb Willow Prescribed Fire Plan has been prepared and is available for review as part of the environmental assessment for this project. The prescribed fire plan carefully analyzes all aspects of the prescribed fire including weather, fuels, fire behavior, public notification, smoke management, equipment and firefighters to complete the project safely and efficiently.

VEGETATION

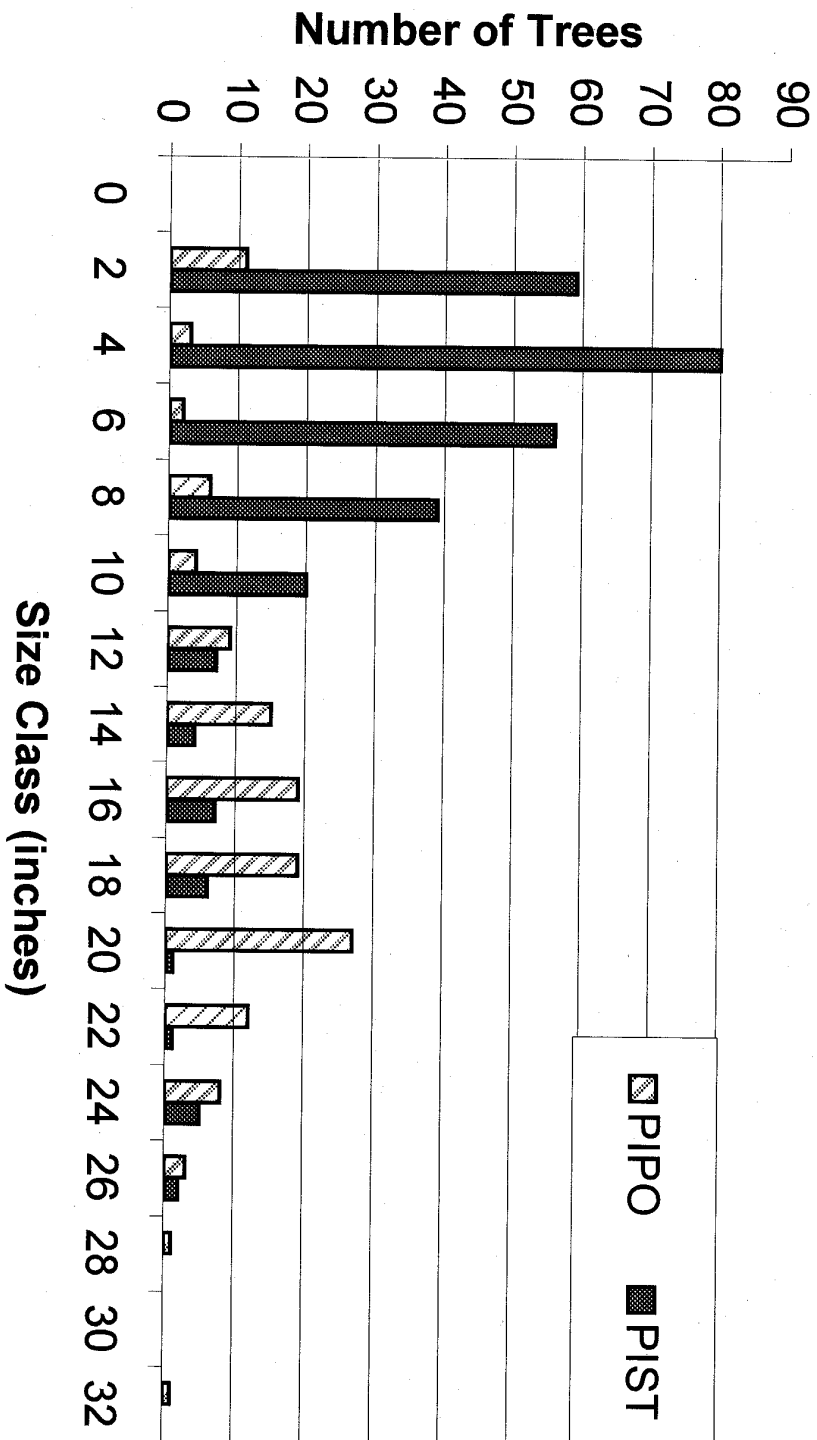
Trees

The table and chart that follow display the ponderosa pine and southwestern white pine distribution in the proposed 65 acre thinning area.

This project will restore natural landscape patterns. Because of the small size of the project in relation to the surrounding forested area, there is little change to overall vegetative conditions of the area.

| Stand Table for the Proposed 65 Acre Thinning Unit at Hart Prairie | | | | | | |
|--|---|--|---|--|------------------------|----------------------------|
| DBH class (in) | Number of Trees <i>Pinus ponderosa</i> | | Number of Trees <i>Pinus strobfiformis</i> | | % composition | |
| | | | | | <i>Pinus ponderosa</i> | <i>Pinus strobfiformis</i> |
| 0 | 0 | | 0 | | 0.00% | 0.00% |
| 2 | 11 | | 59 | | 7.86% | 20.56% |
| 4 | 3 | | 80 | | 2.14% | 27.87% |
| 6 | 2 | | 56 | | 1.43% | 19.51% |
| 8 | 6 | | 39 | | 4.29% | 13.59% |
| 10 | 4 | | 20 | | 2.86% | 6.97% |
| 12 | 9 | | 7 | | 6.43% | 2.44% |
| 14 | 15 | | 4 | | 10.71% | 1.39% |
| 16 | 19 | | 7 | | 13.57% | 2.44% |
| 18 | 19 | | 6 | | 13.57% | 2.09% |
| 20 | 27 | | 1 | | 19.29% | 0.35% |
| 22 | 12 | | 1 | | 8.57% | 0.35% |
| 24 | 8 | | 5 | | 5.71% | 1.74% |
| 26 | 3 | | 2 | | 2.14% | 0.70% |
| 28 | 1 | | 0 | | 0.71% | 0.00% |
| 30 | 0 | | 0 | | 0.00% | 0.00% |
| 32 | 1 | | 0 | | 0.71% | 0.00% |
| Total | 140 | | 287 | | | |

Ponderosa Pine (PIPO) and Southwestern White Pine (PIST) Distribution in the Proposed 65-acre Thinning Area at Hart Prairie



Shrubs, forbs and grasses

Affected Environment

Shrubs: The FMBA contains a unique riparian community in which Bebb willow is the dominant tree in the canopy. The presence of Bebb willow strongly enhances the diversity of understory plants and animals in the community. A diverse population of birds, including neotropical migrants, make their home in the Bebb willow and aspens. Bebb willow is a very widespread species occurring in Eurasia and much of North America (Elmore 1976) but Bebb willow-dominated communities occur at fewer than 20 sites worldwide (Gori 1991, Maschinski 1992). The Fern Mountain population (approximately 1300 plants) is the largest known site, with nearly ten times more Bebb willow trees than any other surveyed population in the Southwest (Waring 1992a). However, the Fern Mountain population of Bebb willow, like most other Bebb willow communities surveyed in the western United States (Atchley 1989, Dorn 1970, Froiland 1962, Waring 1992c, Granfelt 1996), is in a decadent or declining condition, with little evidence of recent recruitment.

Forbs and grasses: Seventy species of grasses, herbs, and shrubs were documented in wet meadow plots by Waring (2000). Bentgrass (*Agrostis scabra*), tufted hairgrass (*Deschampsia caespitosa*), three-stemmed spikerush (*Juncus ensifolius*) and sedges (*Carex* spp.) are characteristic of the wet areas (Waring 2000). Arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montana*), spike muhly (*M. wrightii*), hairy dropseed (*Blepharoneuron tricholepis*), and muttongrass (*Poa fendleriana*) also occur here and shrubby cinquefoil (*Pertaphyllum fruticosum*) grows abundantly.

Under Bebb willow grow bluebells (*Mertensia franciscana*), white crane's bill (*Geranium richardsonii*), wheatgrass (*Agropyron* sp.), wild rose (*Rosa arizonica*), golden pea (*Thermopsis rhombifolia* var. *montana*), bracken fern (*Pteridium aquilinum*), orchard grass (*Dactylis glomerata*), monkshood (*Aconitum columbianum*), fleabane (*Erigeron macranthus*), Canada violet (*Viola canadensis*), Rocky Mountain iris (*Iris missouriensis*), false Solomon's seal (*Smilacina racemosa*), meadow rue (*Thalictrum fendleri*), sneezeweed (*Dugaldia* (*Helenium*) *hoopsii*), bluegrass (*Poa* sp.), brome grass (*Bromus* sp.) and others (Phillips and Phillips nd., Waring 2000, Novak-Goodman 2000).

Waring (2000) also documented 40 species of plants in the dry upland meadows and 29 species in the plots in understory of the ponderosa pine community.

Effects: Under Alternatives A and C, as new perched aquifers develop Bebb willow will regenerate in more locations in the project area. In addition, the prescribed burn in the mid part of the watershed will open up the Bebb willow canopy, provide mineral soil for germinating Bebb willow seeds, and reduce competition from associated grasses and herbs as the seedlings establish. The spring burn (Alternative C) would provide better Bebb willow response than fall burn (Alternative A). Bebb willow is tolerant of intermediate shade conditions, although seedlings grown under more open, sunny conditions have higher growth rates and greater survivorship (Atchley 1989). It is also tolerant to a broader range of moisture conditions than other willow species once beyond the seedling stage. Under Alternative B, only the two fenced springs will continue to persist with seedling Bebb willows.

Under Alternatives A and C, with light to moderate grazing (by ungulates, gophers, insects) the community will transition into a wet meadow with seedling, juvenile, and adult Bebb willows as a result of terrace building, which increases heterogeneity in soil moisture at the site. As a well-formed canopy develops, the shade-tolerant understory species described below will colonize under the Bebb willows. Terrace building will result in the lateral movement of spring output and the creation of new recruitment sites for Bebb willow seedlings. This will give rise to a mixed-age structure Bebb willow-wet meadow community. Under Alternative B, the Bebb willow population will remain in a decadent condition with few seedlings and juvenile plants or decline even further.

Shrubs, forbs, and grass species that respond positively to fire will increase in frequency and cover in those areas that are burned. Arizona fescue, mountain muhly, and Kentucky bluegrass will increase in cover immediately following fire (Waring 2000). Scarlet gilia will increase on Fern Mountain. Wet meadow species such as bentgrass, tufted hairgrass, three-stemmed spikerush, sedges, Chiricahua dock, and Rocky Mountain iris will increase in abundance and cover in FMBA as new springs develop due to increased water and the wet meadows are enhanced and enlarged. Meanwhile those species that currently inhabit the drier portions of lower lying areas will decline in relative abundance and cover except where dry meadows and forest remain.

Forty years later it is expected that plant species diversity will be greater in all habitats in the project area under Alternatives A and C due to restoration of a more natural landscape with ecosystem processes functioning. The wet meadow community will have increased in area relative to the other habitat communities, and additional wet meadow species will become established, brought in by animals attracted to the enhanced wetland. Under Alternative B, the plant diversity will be similar to that which exists today in the project area.

Non-native plants and Noxious Weeds

Affected Environment

The ponderosa pine forest on the Coconino National Forest has been greatly disturbed by logging, livestock grazing, roads, recreation, and the recent expansion of cities, towns and summer homes. Studies of the 1996 wildfires around Flagstaff revealed an exotic flora of over 30 non-native species, including such invasive or noxious plants as Russian thistle (*Salsola kali*), cheatgrass (*Bromus tectorum*), Dalmatian toadflax (*Linaria dalmatica*), bull thistle (*Cirsium vulgare*) and other species (Crawford et al. 2000; Griffis et al. 2000). Invasive non-native grasses in abundance in the FMBA project area include Kentucky bluegrass (*Poa pratensis*) and orchard grass (*Dactylis glomerata*). Noxious weeds in the project area include Dalmatian toadflax and bull thistle. Scotch thistle (*Onopordum acanthium*), musk thistle (*Carduus nutans*), and houndstongue (*Cynoglossum officinale*) grow immediately adjacent to the project area along roads and at the Snowbowl parking lot.

Effects

Since surveys for non-native species will be done prior to project work, and the Best Management Practices contained in the Three-forest Noxious Weeds Strategic Plan Working Guidelines (Phillips et al. 1998) will be implemented for this project under Alternatives A and C, presence of noxious weed species immediately after treatment should be minimal and they will be immediately removed. Where

present in the project area, the invasive non-native Kentucky bluegrass will probably increase in percent ground cover when burned (Waring 2000). Under Alternative B following the Three-forest Noxious Weeds Strategic Plan Working Guidelines, noxious weeds will be removed as personnel and funding permits, depending upon the noxious weed and seriousness of the threat.

Non-native and noxious weed species in 20 years due to the implementation of this project should likewise be negligible since the project's intent is to restore a healthy functioning ecosystem that will contain a diversity of native species to compete with non-native and noxious plants. Also, the Forest will continue to implement Best Management Practices to contain and control noxious weeds.

SOIL AND WATER

The Restoration Project is located in the uppermost portion of Sycamore Canyon 5th code watershed, upstream of Volunteer Canyon, at the base of San Francisco Peaks. Sycamore Canyon watershed (1506020286) originates on the western slopes of Humphries Peak at an elevation of 12,633 feet. Elevation in the project area ranges from around 8,500 to 8870 feet.

Data from the Flagstaff Airport suggests that annual precipitation averages around 19 inches at Hart Prairie. Precipitation is evenly distributed between summer and winter months in the lower elevations, although runoff is supplied mainly by snowmelt in the months of March, April, and May. Winter precipitation exceeds summer precipitation at the higher elevations by roughly 20 percent.

The majority of precipitation occurs during the fall and winter months (October to April). Snowmelt, from late February to mid-May produces most of the runoff. Occasional winter frontal storms also produce runoff from heavy or prolonged rain events. Very little runoff occurs during the months of mid-May to October.

Water released from the watershed has been monitored since 1996. In 1996 due to extreme drought conditions, no water flowed through the H-flume at the base of the watershed. In 1997 water from snowmelt flowed until mid June. Unfortunately flow stopped prior to Bebb willow regeneration. The highest recorded 1997 flow occurred in late April at 2,050 cubic meters per day. In 1998 the snowpack was much deeper than in 1997 and water flowed through the flume until mid July. Although water was flowing during Bebb willow regeneration, the amount at less than 250 cubic meters per day is not high enough to support successful seed germination. The highest recorded flow occurred in mid April at 15,903 cubic meters per day. It is anticipated that the amounts being released from the watershed in May and June will be increased following a spring burn and the 65-acre thinning.

On-Site Environmental Effects

Soils in the proposed action area include the following Terrestrial Survey of the Coconino National Forest map units:

Map Unit 60 – 11 acres are proposed for burning. This component is classified as a Fluventic Haploboroll, a generally deep, very bouldery, fine sandy loam soil that is occasionally flooded. Further

downstream within this valley plain is the majority of the Bebb' Willow community. Soil condition is satisfactory with surface components consisting of 50% rock fragments, 5% bare soil, 55% litter, and 10% vegetative basal area.

Map Unit 640 – 288 acres burning and thinning <6", 60 acres thinning all sizes, < 1 acre tank work. This soil is classified as a Pachic Udic Argiboroll, a generally deep gravelly loam. These alluvial fans are derived from andesite/dacite. This soil is considered a fire disclimax where fire created and maintained the open park-like conditions of the grassland in the past. This soil occurs on warmer, dryer aspects than the adjacent mixed conifer map units. This map unit is dependent on recurrent fire to maintain the high canopy coverage of grass and low canopy coverage of conifer. This soil has a moderate erosion hazard and high revegetation potential. The soil is in satisfactory condition with surface components consisting of 25% rock fragments, 10% bare soil, 40% litter, and 35% vegetative basal area.

Map Unit 653 – 21 acres burning and thinning <6". This soil is classified as a Eutric Glossoboralf, a generally moderately deep, cobbly loam. These elevated planes/alluvial fans are in satisfactory condition with 20% rock fragments, 15% bare soil, 65% litter, and 5% vegetative basal area.

Map Unit 563 – 78 acres burning. This cinder cone has a severe erosion hazard due to steep slope. The soil is in satisfactory condition.

Soil quality is a term used to describe the productive potential, hydrologic function, and environmental health of the soil. Soil is the nutritional and physical foundation for plant growth, which in turn provides food and structure for other living organisms. Some soil properties are closely linked with productivity. For instance, substantial losses of organic matter and soil porosity may lead to declines in productivity. Loss of soil cover is associated with erosion and changes in long-term productivity.

Soil cover provides surface soil protection to prevent erosion from occurring at rates that exceed the rate of soil formation. Soil cover can include litter, rock fragments, and living vegetation. Soil surface cover should be promoted on all soils in the area, but particularly on steeper slopes where erosion hazard is moderate or above.

Soil porosity refers to the amount of pore space or voids in the soil. The availability of water, air, and nutrients to plant roots decreases as pores are reduced in size or clogged. When water cannot infiltrate into the soil, it will run off on the surface.

Organic matter consists of humus, litter, and dead woody material on or in the soil. These materials are important because they increase infiltration, improve aeration and retention of moisture, support microbial activity, and are reservoirs for short and long term nutrient supply.

Effects of tree thinning from alternatives A and C on Soil Condition.

Soil condition will not be significantly affected by the thinning and tree removal aspect of the project. No heavy equipment will be used to harvest trees or pile slash. Most of the tree cutting will be accomplished by hand, producing no impact to the soil surface. Some soil cover and increase in coarse woody debris will result from the boles and limbs of the trees that remain after burning. By removing all

trees over 60 acres and thinning trees <6" over 288 acres, the grassland character of the prairie will be promoted. Ground cover composition will favor grasses and plant litter over needle cast from conifer trees.

Effects of tree thinning from alternative B on Soil Condition.

There will be no on site effect on soil condition from the no action alternative. The grassland soils will continue to be invaded by conifer trees, reducing herbaceous vegetation while canopy cover and needle litter increase.

Effects of alternatives A and C tree thinning on Hydrologic Function

The high elevation riparian area at Hart Prairie is largely supported by shallow ground water produced from precipitation, infiltration, and runoff from the small watershed area above the plant community. The Bebb willow community is believed to have insufficient regeneration to sustain itself over time, and as a result, is considered to be unhealthy. Bebb willow trees are reported to be producing abundant viable seed (Church 2000), but soils may be too dry during critical germination periods. The clearing of conifer trees on a 60 acre sub-watershed directly above the community and thinning ponderosa pine trees <6" over 288 acres is intended to reduce transpirational water loss from the watershed supporting the willow community. Monitoring activities conducted by Northern Arizona University have focused on two coniferous species (ponderosa pine and southwestern white pine) encroaching into the prairie above the Bebb willow community. Analysis of the data suggests that ponderosa pine transpires much more water than southwestern white pine and at much greater rates. Also, large trees use much more water than small trees. Stand level estimates of average water use per day indicate that in the proposed thinning area, total water use may be reduced by 269,521 liters/day in the monsoon season and 183,603 liters/day in the pre-monsoon season.

Monitoring of water use by small trees (6" and less) has been less intensive. Individually, small trees transpire little water. However, given size of the burn and thin area and the number of small trees, it is possible that the trees removed in this area will significantly reduce annual water use. A detailed description of the estimated effects on the water budget from thinning and burning can be found in the project record.

The grasses are using approximately 1.6 acre-feet of water during the premonsoon time period (May and June). A prescribed fire in the early spring would likely release some of this water to the downslope riparian community. The grass community is expected to resprout quickly from root systems that will not be completely killed in a prescribed burn so a fall burn may not be as effective as a spring burn.

Effects of Alternative B on Hydrologic Function

Current transpirational water losses will not change in the short term. As existing trees continue to grow and new trees establish, transpiration losses will increase over time.

Effects from Prescribed Fire

Fire effects on soil, water, and watershed resources may range widely due to variability in resource conditions, season, intensity of burning, and timing, and intensity of precipitation before and after burning. Fire may have perceived negative, beneficial, or benign effects, which may persist for short or long periods.

Soil heating: The degree to which soil is heated depends on a variety of factors including: soil moisture, fuel loading, fuel moisture, fuel distribution, soil texture, and others. The peak temperature and duration of heating greatly influence subsurface soil temperature. The amount of change in soil properties is largely dependent on the amount of energy radiated downward into the underlying duff and mineral soil. The amount of heat radiated downward increases as fire severity increases. Low severity fires burning only surface fuels do not significantly heat the soil surface. Soil temperatures do not rise substantially where repeated cool-burning fires are used to reduce fuel buildup (Debano et al. 1998).

Physical Effects: Heating may cause changes in soil properties such as: reduction of structure, reduction of porosity, and change of soil color. Burning reduces soil organic matter, and soil plant and litter cover. In most cases, soil erosion by wind and water is increased. The severity and duration of accelerated erosion depend on slope, soil texture, recovery of plant material, severity and extent of burning, and post fire precipitation timing and intensity. Duration of the effects of fire on soil structure range from one year to many decades depending on the severity of the fire and rate of recovery.

High degrees of soil heating can destroy soil structure, affecting soil pore size distribution and overall porosity. This reduces infiltration rates and increases overland flow. Soil water repellency is increased as organic matter is heated. The more severe the fire, the deeper the water repellent layer unless heating is so intense that surface organic matter is destroyed.

Effects of Prescribed Fire from alternatives A and C on Soil Condition.

In **Alternative C**, the proposed prescribed burning will take place in the spring when soil moisture is relatively high. Fuels in the area are primarily grasses, a fuel type characterized by fairly rapid, low intensity fire. Cool prescribed burning will have the effect of reducing litter accumulations while resulting in little mortality of grass plants. Short-term reductions in ground cover will result where litter is totally consumed. Past experience and studies (Lindenmuth 1960; Davis et al 1968; Sackett et al 1993) show that this bare soil is covered by litter or vegetation within one to two years. Total consumption is patchy and will not adversely affect overall ground cover.

Soil porosity will not be adversely affected due to the low intensity nature of the fire. Soil heating will not be significant due to the light fuel loading and rapid nature of fire spread.

In **Alternative A**, prescribed burning may take place at any time of the year. Soil moisture may be lower than under alternative C, but Alternative A is still expected to result in no significant soil heating that would adversely affect soil cover or soil porosity.

Effects of Prescribed Fire from Alternative B on Soil Condition.

No prescribed fire will occur.

Off- Site Environmental Effects - Thinning

The Restoration of a High Elevation Riparian Community Project occurs in the Sycamore Canyon 5th code watershed. The following table is a summary of number of total acres within the Sycamore Canyon 5th code and the percent of the analysis area within the watershed.

| Watershed (Acres) | Restoration (Acres) | % Of Analysis Area Within Watershed |
|----------------------------|------------------------|--|
| Sycamore Canyon 103,840 | 403 | .39% |

The Potential Off-site effects associated with the Proposal include sedimentation from ground disturbing activities, and increases in runoff.

Water Quality

The Department of Environmental Quality water quality assessment report referred to as the "2000 305(b) Report" is a description of the status of water quality in Arizona. The report was prepared to fulfill tri-annual reporting requirements contained in the Clean Water Act. The following table is a summary of the water quality status of stream courses affected by this project.

| Water Quality Status of Watersheds Affected Hart Prairie Restoration Project Area | | | | | | |
|---|---------------------------------|-----------------------|---------------------------------------|-----------------------------|--------------------|--|
| WATERBODY NAME LOCATION REACH OR LAKE NUMBER | WATERB ODY SIZE- miles | DESIGNATED USES | ASSESSMEN T CATEGORY | WATER QUALITY LIMITED | USE SUPPOR T | ASSESSMENT COMMENTS |
| Sycamore Creek Headwaters Verde River AZ15060203-055 | 13 | A&Wc, FC, FBC, AgI | Evaluated Exceptional Community | | Full | ADEQ Biocriteria Development Reference Site. |

ADEQ = Arizona Department of Environmental Quality, AGFD = Arizona Game and Fish Department,
A&Wc = Aquatic and Wildlife (cold water fish), A&Ww = Aquatic and Wildlife (warm water fish), FBC = Full Body Contact,
FC = Fish Consumption, AgI = Agriculture Irrigation, AgL = Agriculture Livestock Watering, DWC = Domestic Water Source.

The Nonpoint Source Intergovernmental Agreement signed by the Forest Service (Region 3) and the Arizona Department of Environmental Quality states that the Forest Service will endeavor to minimize and mitigate all potential nonpoint source pollution activities. As agreed upon by the State of Arizona and the Forest Service, the most practical and effective means of controlling potential nonpoint pollution sources from forests and rangelands is through the development of preventive or mitigating land management practices, generally referred to as Best Management Practices (BMPs), or in the case of Arizona's process, Guidance Practices (GPs). The purpose of this agreement is to meet objectives defined by the United States Congress in the Federal Water Pollution Control Act (as amended in 1987). These objectives are to restore and maintain the chemical, physical and biological integrity of the

nation's waters in Arizona by complying with water quality standards identified for designated uses in downstream perennial waters.

BMPs or GPs were developed for the project through the Integrated Resource Management process and will apply to all treatment alternatives. These GPs are designed to protect soil and water quality. Other BMPs or GPs have been adopted from the "Draft Best Management Practices and Rangeland Guidance Practices for Grazing Activities in Arizona, 1991."

Environmental Effects, Cumulative Effects

Other projects located within the Sycamore Canyon watershed that have occurred in the past 10 years will be considered in terms of potential cumulative effects to water quality. These projects include: Several grazing allotments occur within the Sycamore Canyon watershed.

The project area is within the Peaks allotment (4813 acres). No domestic livestock grazing has occurred on this portion of the allotment since 1985.

An earthen dam within the current project area was removed in 1996.

Cumulative effects of land disturbing activities can be seen as on site, or downstream of the activity. On site effects, include changes to soil characteristics, vegetation, and nutrient cycling. Downstream effects may include changes in the amount and timing of overland flow, and sediment transport. There are not expected to be any significant **on site** cumulative effects as there has been little ground disturbing activity in the project area in the recent past and there is little expected in the near future. Best Management Practices have been developed for the area that will assure minimal impact to on site soil and water resources. These practices include:

- Burning in the spring when soil moisture is relatively high (Alternative C)
- Use of hand equipment to accomplish tree felling and piling of slash.
- Only modifying the spillway at Snowbowl Tank.

Recreational use in the Hart Prairie is moderate and will probably increase in the future. Individuals and groups use the area and activities include hiking, horseback riding, bicycling, jeep driving, off-highway vehicle driving, and dispersed camping to name a few. In some places throughout the watershed, recreation uses cause one or more of the following effects: loss of vegetative ground cover, soil compaction, localized erosion, increased runoff and biological pollution. Current and future recreation management focuses on managing dispersed recreation for an overall beneficial effect to the watershed from the impacts of recreation.

Several earthen tanks downstream of the project area will serve to store any project-generated sediment or runoff associated with the action alternatives.

The Wild Bill Allotment is downstream of the project area 18,507 acres. Within this allotment, the unnamed streamcourse associated with the project area encounters its first impoundment at Moore Tank. This tank is 11,996 meters below the project area.

Downstream of the Wild Bill Allotment is the Maxwell Springs Allotment (14,597 acres). Within this allotment, the streamcourse encounters the second impoundment at Drowned Timber Tank. This tank is 2791 meters below Moor Tank. The streamcourse then essentially ends at Bellemont Flat, 3467 meters below Drowned Timber Tank.

Analysis of the streamcourse associated with the project area and its position on the landscape indicate that any **offsite** effects from the project activity would not extend beyond Bellemont Flat. Consequently, there will be no adverse **cumulative** effects to water quality or to increased peak flow from any alternatives.

ANIMALS and PLANTS

Threatened, Endangered, Sensitive Species and Forest Species of Concern

Rare species with known or potential habitat within or adjacent to the project area are:

| Common name | Scientific name | Status |
|---------------------------------|----------------------------------|--------------------------|
| | | |
| Navajo Mtn. Mexican vole | <i>Microtus mexicanus navaho</i> | Forest Service Sensitive |
| American peregrine falcon | <i>Falco peregrinus anatum</i> | Forest Service Sensitive |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | Threatened |
| Mexican spotted owl | <i>Strix occidentalis lucida</i> | Threatened |
| Northern goshawk | <i>Accipter gentilis</i> | Forest Service Sensitive |
| Spotted skipperling | <i>Piruna polingii</i> | Forest Service Sensitive |
| Mountain silverspot butterfly | <i>Speyeria nokomis nitocris</i> | Forest Service Sensitive |
| Blue_black silverspot butterfly | <i>Speyeria nokomis nokomis</i> | Forest Service Sensitive |
| Rusby's milk vetch | <i>Astragalus rusbyi</i> | Forest Service Sensitive |

Affected Environment – Special Status Species – Plants

Other plant species of special concern to the Forest in the project area are: Bebb willow, scarlet gilia, and Chiricahua dock.

***Salix Bebbiana* Sarg. Bebb willow (Salicaceae – Willow family)**

Bebb willow is dioecious (unisexual flowers are produced on separate plants) shrub to small tree to 4.5 m tall. Seed dispersal at Hart Prairie occurs from late June to early July. Seeds are small and have a very short period of viability after maturity (Waring 1992 b). The herbaceous cover currently under the Bebb willows may prevent dispersing willow seed from reaching an adequate seedbed of bare mineral soil. Studies at Fern Mountain found that disturbance is likely to enhance regeneration by reducing plant

competition (Waring 1992c). Zasada et al. (1993) found that severely burned soils improved Bebb willow seedling success.

***Astragalus rusbyi* Greene.** Rusby milkvetch. (Fabaceae - Bean family).

This perennial herb with upright form can vary in height from 6 to 18 inches and Each leaf is from one to three inches long and has pinnately compound leaves with 17 to 25 oval leaflets. No tendrils are present on the reddish stems. A distinguishing character is trigonus pods (triangular in cross section) which also have small black hairs. Seed pods also have a stipe, which is best described as a narrow area at the base of the pod where it connects the plant. The flowers are white to cream color and pea-like. The species blooms from May to September. The plants apparently put on much growth during the summer monsoons. This species is similar to the more common *Astragalus recurvus*.

Habitats where this plant is likely to be found include aspen groves, mixed conifer forests, ponderosa pine/ Arizona fescue, and ponderosa pine/Gambel oak sites in dry or temporarily moist basaltic soils. The species is found from 6,500 to 9000 feet. Preliminary data from the Fort Valley Restoration plots suggests that this species does better in more open areas rather than in areas with dense canopy and heavy litter on the ground. Rusby milkvetch in the burn, and thin and burn plots, and in the more open areas outside the experimental plots were tall, upright and relatively vigorous. Plants in doghair thickets with high canopy cover and thick layers of pine needle duff were fewer in number, shorter, and less vigorous (fewer smaller stems).

This species is known from northern and central Arizona. The type specimen is from Mount Humphrey. Known locations of this plant include the Fort Valley restoration plots; Veit Springs; and the Wild Bill Study Plots (1963) on the Coconino NF. It is also known from Camp Navajo, near Parks and Garland Prairie near Williams on the Forest Alliance restoration plots, and near Volunteer Canyon, Kaibab NF. It is also known from Mount Trumbull (BLM).

***Ipomopsis aggregata* (Pursh) V. Grant:** Scarlet Gilia (Polemoniaceae)

Scarlet gilia grows on Fern Mountain within the project area. This species is a red flowered monocarpic biennial herb of western montane regions that flowers from early-mid July through late September. Following seed germination scarlet gilia develops into a leafy rosette and after 1-8 years of vegetative growth a single paniculate-racemose inflorescence is produced (Paige and Whitham 1987). Following stem elongation the plant flowers, reproduces and then dies.

Studies on the effects of fire on scarlet gilia were conducted during the summers of 1989 through 1991 at the Museum of Northern Arizona. The most common response to fire was the production of one or more new clonally derived rosettes. These newly formed rosettes delayed flowering for at least one year and had significantly higher overwinter mortality rates than rosettes from unburned control plots. There was no detrimental effect on the reproductive success (seed production) of individuals that flowered following the burn. In the year of the burn there was a 116-fold increase in the number of germinating seeds, and by the second year this translated into an approximate 6-fold difference in the number of surviving rosettes (Paige 1992).

Scarlet gilia increased 20 percent following the 3 acre June 1998 burn on Fern Mountain (Smith personal communication 2001).

***Rumex orthoneurus* Rech. f.** Chiricahua Dock, Bloomer's Dock (Polygonaceae – Smartweed family)

Chiricahua dock is an herbaceous, robust perennial known from the mountains of Arizona, New Mexico and Mexico. Plants grow to 1 m in height with inflorescence stalks up to 2 m on more vigorous specimens. The large oblong to oblong-lanceolate basal leaves are up to 50 cm long and 18 cm wide. Characteristics differentiating this plant from other members in its genus include woody rhizomes on mature plants which appear banded; lateral leaf veins almost perpendicular to the middle vein of the leaf; and lack of callosities or swellings on the valves or midribs of the fruiting capsules.

Rumex orthoneurus occurs in moist loamy soils within riparian and wetland habitats and in cienegas, springs and streams. It is found at elevations primarily between 2000-3500 m. This species is currently known from 4 spring sites in the project area. One site has two plants; a second site has scattered individuals along the ephemeral creekbed; the last two sites each have dense mat-like clones with 40-60 % cover over more than 50 sq. m.

Rumex orthoneurus was withdrawn from listing as a threatened species by the Fish and Wildlife Service (50CFRart17 (Vol. 64, No. 152; Aug. 9, 1999). Although wildfire has destroyed two populations and can be a threat, physiological adaptations such as asexual reproduction and dormancy during drought enable plants to be somewhat resilient to disturbance and stochastic events.

Effects – Special Status species Plants

| Species | Alt A | Alt B (no action) | Alt C |
|--|--|--|---|
| <i>Salix Bebbiana</i> Sarg. Bebb willow (Salicaceae – Willow family) | Bebb willow will regenerate in more scattered locations as new perched aquifers provide wet areas for habitat; some new regeneration sites may be created in the burn area; the population will assume a more normal distribution in age classes and total numbers of plants will increase; juvenile and adult trees will thrive with increased water availability | Bebb willow will regenerate in only currently fenced spring areas; these young plants will grow slowly because the spring recharge is dependent on good weather conditions; large trees will hang on but not thrive; over time the population will decline as trees die from competition with grasses and invading conifers and aspens and regeneration is insufficient to replace | More Bebb willow regeneration will occur than under Alt A because spring burning will remove competition of grasses and expose mineral soil for seeds which are dropped before the monsoons; existing juveniles and adults will be healthier, live longer, and produce more viable seed than under Alt B. |

| | | | |
|--|--|---|---|
| | | dying trees | |
| <i>Ipomopsis aggregata</i> (Pursh) V. Grant: Scarlet Gilia (Polemoniaceae) | Scarlet gilia population will greatly increase following prescribed fire as offsets from fire-damaged plants produce seeds into mineral soil in open habitat with less competition from other plants | Scarlet gilia population will decline in absence of fire due to competition from associated grasses, herbs and bracken fern | Scarlet gilia population will greatly increase following prescribed fire as offsets from fire-damaged plants produce seeds into mineral soil in open habitat with less competition from other plants. Burn is better in spring (Alt C) because fall burn would destroy seedheads on plants. |
| <i>Astragalus rusbyi</i> Greene. Rusby milkvetch. (Fabaceae-Bean family). | Rusby milkvetch will regenerate due to prescribed fire; plants will become larger and more robust with less litter and shade | Rusby milkvetch will maintain current abundance and spindly size | Rusby milkvetch will regenerate due to prescribed fire; plants will become larger and more robust with less litter and shade |
| <i>Rumex orthoneurus</i> Rech. f. Chiricahua Dock, Bloomer's Dock (Polygonaceae – Smartweed family) | Chiricahua Dock will regenerate in more scattered locations as new perched aquifers provide wet areas for habitat; existing adults will be healthier, live longer, and produce more viable seed | Chiricahua Dock will be large and reproductive in only currently fenced spring areas | Chiricahua Dock will regenerate in more scattered locations as new perched aquifers provide wet areas for habitat; existing adults will be healthier, live longer, and produce more viable seed |

Affected Environment – Special Status Species Mammals, Birds and Insects

Navajo Mtn. Mexican vole:

Hoffmeister (1986) has delineated the range for this vole from Navajo Mountain southward to the western part of the Mogollon Plateau from near Mormon Lake westward to the vicinity of Williams. Locations have been reported from 3800 to 9700 feet in elevation with a number of locations around the San Francisco Peaks area. Voles occupy meadows and riparian areas above the Mogollon Rim. They also occur within the forested areas where tree densities are low. They rely on grasses and other herbaceous vegetation for food and cover.

American peregrine falcon:

The essential habitat for peregrine falcon includes rock cliffs for nesting and a large foraging area. Suitable nesting sites on rock cliffs have a mean height of 200 to 300 feet. It occurs state wide as a

migrant, transient and/or wintering individual. Peregrines prey mainly on birds found in wetlands, riparian areas, meadows, parklands, croplands, mountain valleys, and lakes within a 10 to 20 mile radius from the nest site. Prey items include bats, mammals, and birds.

Bald eagle:

Bald eagles are primarily winter visitors to the Coconino National Forest occupying all habitat types and elevations. Wintering eagles arrive in the fall, usually late October or early November, and leave in early to mid-April. They feed on fish, waterfowl, terrestrial vertebrates, and carrion. There are no riparian areas on or near the project that would be used for existing or potential nesting or roosting. The nearest area receiving heavy use by bald eagles is 3.2 miles away in the vicinity of A-1 Mountain. Occasional foraging use is expected within or adjacent to project. No surveys have been conducted for this species in the project area. The nearest survey is the mid winter bald eagle count along Highway 180 with low use reported in the years surveyed. Bald eagles have not been reported from the Conservancy property.

Mexican spotted owl:

On the Coconino National Forest, the Mexican spotted owl occupies mixed conifer and ponderosa pine/gambel oak vegetation types, usually characterized by high canopy closure, high stem density, multi-layered canopies within the stand, numerous snags, and downed woody material. Much suitable nesting/roosting owl habitat is characterized by steep slopes and canyons with rocky cliffs. The breeding season occurs from March 1 through August 31.

The nearest PACs are between 0.9 and 1.15 miles away. There are no PACs immediately upslope of the project. There is no protected or restricted habitat within the project area boundary. The Kachina Peaks Wilderness protected habitat (about 18,900 acres), is adjacent to the 325 acre thin and burn on Hart Prairie and about ¼ mile from the 60 acre thin. Surveys have been conducted in nearby habitats with negative results.

Northern goshawk

The principle forest types occupied by the goshawk in the Southwest are ponderosa pine, mixed species, and spruce-fir. The goshawk is a forest habitat generalist that uses a wide variety of forest stages. The goshawk preys on large to medium sized birds and mammals which it captures on the ground. It prefers stands of intermediate canopy cover for nesting, while more open areas are used for foraging. All forested (ponderosa pine and mixed conifer) habitat above the rim is considered to be goshawk habitat. The nearest goshawk PFAs are 040207 at 1.77 miles away and 040215 at 2.24 miles away. Nest surveys in 1999 in the area on Hart Prairie to be treated yielded negative results. Portions of the project area are foraging habitat.

Butterflies: About 37 species of butterflies have been documented from the Hart Prairie Region (Nature Conservancy, 2000). None of the butterflies identified as sensitive species on Coconino National Forest have been documented.

Spotted skipperling:

In southeast Arizona, this species takes nectar avidly along cool, deep canyons and along forested road margins. The species has been seen congregating in numbers on moist cliffsides. *Dactylis glomerata* (Poaceae) is a strongly suspected food plant. There is a single rainy season brood. Known to occur along the Mogollon Rim. The habitat of the spotted skipperling consists of moist meadows and streamsides in low to mid elevation mountains. It's limited range in Arizona includes the Huachucas, Chiricahuas and the Mogollon Rim. Habitat includes the transition zone and open woodland grassy areas. The project area could be potential habitat for this species.

Mountain silverspot butterfly:

Scattered populations of this species occur throughout the southwest in wet meadows, grassy springs in mountainous woody areas, seeps, or riparian canyons. Habitat is upper Sonoran to Canadian zone. This species of butterfly produces one generation per year. Adults fly from late July through mid September. Eggs are laid near *Viola nephrophylla* spp. Caterpillars overwinter in grass stems after hatching. The following spring, caterpillars feed on *Viola* spp. Larvae are nocturnal feeders. Adults are nectar feeders, often from thistles. The project area is potential habitat for this species.

Blue_black silverspot butterfly:

Global range is very local in Arizona and New Mexico where it has been extirpated from most of its known sites; found in streamside meadows and seepage areas with an abundance of violets, generally in desert landscapes. The species as a whole uses moist meadows, seeps, marshes and streamsides; caterpillar hosts are violets; adult food is flower nectar, including that from thistles; females lay single eggs on the ground near host plants. The project area is potential habitat for this species.

Effects – Special Status Species – Mammals, Birds and Insects

| Species | Alternative A | Alternative B | Alternative C |
|---------------------------|---|--|---|
| Black-footed ferret** | No effect due to lack of prairie dog colonies within project; lack of prairie dog control measures. Thinning and burning will provide open habitat facilitating prairie dog movement between nearby colonies. | No direct or indirect effects due to lack of impact on nearby colonies. Loss of meadow habitat will continue over long term due to conifer encroachment with a negative effect to prairie dogs. | No effect due to lack of prairie dog colonies within project; lack of prairie dog control measures. Thinning and burning will provide open habitat facilitating prairie dog movement between nearby colonies. |
| Navajo Mtn. Mexican vole | May impact individuals* due to thinning and burning. Survival of young influenced by timing of understory removal due to burning with vole life cycle. Thinning and burning indirectly beneficial by opening canopy. Vegetation removal with burning could be negative if voles present. Weed treatments expected to have positive indirect effect due to maintaining native diversity and abundance. | No impact due to lack of management activities in vole habitat. No improvement will occur due to lack of thinning, no weed treatments or burning to maintain openness in forest. Wildlife grazing will continue in all alternatives to remove cover and food. | May impact individuals* due to thinning and burning. Similar effects as A. |
| American peregrine falcon | No impact to the species. The project area does not contain occupied or potential eyries, only foraging habitat. Nearest eyrie @ 9 miles away. No impact to the species due to lack of impacts to eyries and lack of disturbance. Prey species will remain in area although prey species composition might shift. Prey accessibility may be enhanced with thinning and burning. The scope and magnitude of project is relatively small. | No impact to the species. . The project area does not contain any occupied or potential eyries, only foraging habitat. The nearest eyrie is @ 9 miles away. No impacts to eyries or foraging. Prey species currently exist in area. Species composition might shift as conifer encroachment continues. | No impact to the species. . The project area does not contain any occupied or potential eyries, only foraging habitat. The nearest eyrie is @ 9 miles away. No impact to the species due to lack of impacts to eyries and lack of disturbance. Prey species will remain in area during and following treatment although prey species composition might shift. Prey accessibility may be enhanced W/ thinning & burning. The scope & magnitude of this project is small. |

| Species | Alternative A | Alternative B | Alternative C |
|---------------------|---|--|--|
| Bald eagle | No effect because no nests or roosts will be affected. Snags and large trees will remain in the vicinity to use as perches. Some large trees will be cut but the scale of this will not preclude eagle use in area. Project is adjacent to Kachina Peaks Wilderness in which perch trees are abundant. | No effect because no nests, roosts, snags or large trees will be affected. There are no direct or indirect effects to bald eagles or their habitat in any alternative. | No effect because no nests or roosts will be affected. Snags and large trees will remain in the vicinity to use as perches. Some large trees will be cut but the scale of this will not preclude eagle use in area. Project is adjacent to Kachina Peaks Wilderness in which perch trees are abundant. |
| Mexican spotted owl | No effect because burning, thinning and dam modification will not modify Mexican spotted owl habitat or constitute a disturbance to the species. | No effect due to lack of habitat modification and disturbance. | No effect because burning, thinning and dam modification will not modify Mexican spotted owl habitat or constitute a disturbance to the species. |
| Northern goshawk | May impact individuals* due to thinning & burning in foraging habitat. Not expected to significantly affect overall prey availability because goshawks cover large areas when foraging, have a broad diet, hunt opportunistically and some goshawk prey species find food or shelter or both in habitat components such as logs, rock outcrops, snags, aspen and live trees. Timing of burning will not disturb goshawks. Timing of thinning should have no impact to nesting goshawks because none are known from this area. Burning: opening habitat allowing more herbaceous | No impact to the species. Canopy cover expected to increase over time resulting in net loss of herbaceous understory for some prey yet retaining overstory habitat for other species. Indirect negative effects to prey habitat due to lack of noxious weed treatments. Gradual conversion of riparian area to wet meadow little effect. | May impact individuals* due to thinning & burning. Similar impacts as A. |

| Species | Alternative A | Alternative B | Alternative C |
|---------------------------------|--|--|---|
| | response. Minimal loss of logs and snags. Noxious weed treatments indirectly beneficial. Foraging habitat improved by modification of Snowbowl Tank dam. | | |
| Spotted skipperling | May impact individuals* due to positive effects to riparian habitat and opening of habitat. | No impact to the species although decreased quality of potential habitat expected as riparian area converts to a wet meadow. | May impact individuals* due to positive effects to riparian habitat and opening of habitat. |
| Mountain silverspot butterfly | May impact individuals* due to positive effects to riparian habitat and opening of habitat. | No impact to the species although decreased quality of potential habitat expected as riparian area converts to a wet meadow. | May impact individuals* due to positive effects to riparian habitat and opening of habitat. |
| Blue_black silverspot butterfly | May impact individuals* due to positive effects to riparian habitat and opening of habitat. | No impact to the species although decreased quality of potential habitat expected as riparian area converts to a wet meadow. | May impact individuals* due to positive effects to riparian habitat and opening of habitat. |

*The determination of effect for these Forest Service sensitive species is: 'may impact individuals but is not likely to result in a trend toward federal listing or loss of viability'. The scope and magnitude of this effect can vary by alternative and species.

**The effect to black-footed ferrets has been evaluated because the project lies within the boundaries of a prairie dog complex, even though no colonies exist within project boundaries.

Cumulative effects – Special Status Species – Mammals, Birds and Insects

Prairie dogs, the primary food source for ferrets are negatively affected by legal shooting, predation by domestic and wild predators and are susceptible to major disease outbreaks such as plague. Navajo Mountain Mexican voles are affected by domestic and wildlife grazing in their habitat which removes needed cover and food. Effect in this area is low due to lack of cattle grazing in recent history and high understory productivity of this area. Fire suppression has a negative impact due to maintenance of high canopy closures and reduction of meadow habitat needed by this species. Peregrine Falcons can be negatively affected by disturbance at eyries such as rock climbing and people presence. Bald eagles are cumulatively impacted by heavy metals, which cause eggshell thinning, and by the threat of catastrophic fire to roosts. Loss of vigor of existing roosts is possible in foreseeable future if drought conditions in this region persist. Mexican Spotted Owls in this vicinity are threatened in some areas by increasing human use in their home ranges which can result in a proliferation of roads and trails and an increase in disturbance. The threat of catastrophic fire is high and could result in significant losses of habitat such

as occurred on the Hochderffer Fire in 1996 and the Pumpkin Fire in 2000. Northern goshawk habitat is also threatened by catastrophic fire; and is influenced by fire suppression which reduces community vigor and diversity and by grazing which modifies habitat of prey species. The three rare butterflies mentioned above are negatively affected by grazing which could impact larval or adult host plants and fire suppression which could result in eventual loss of riparian habitat in this area.

Management Indicator Species

Affected Environment – Management Indicator Species

MA 3 - Ponderosa Pine and Mixed Conifer, less than 40% slopes: Ponderosa pine and mixed conifer < 40% slope: pygmy nuthatches, abert squirrel, red squirrel, hairy woodpeckers, turkey, Mexican spotted owl and northern goshawk

MA 9 - Mountain Grassland: antelope and elk.

MA17 – No Indicator species listed in the Forest Plan for this MA.

Effects – Management Indicator Species

None of the alternatives are anticipated to result in a decline in population viability on the Forest for any management indicator species.

| MIS | Alternative A | Alternative B | Alternative C |
|------------------|---|--|---|
| Pygmy nuthatches | Thinning will remove a few large trees on which this species relies. Scale and magnitude of this action will not influence population viability on the forest. Abundant nearby habitat on Hart Prairie and Kachina Peaks Wilderness exists for this species. | No changes to species habitat will occur. No impact to population viability on forest. | Thinning will remove a few large trees on which this species relies. Scale and magnitude of this action will not influence population viability on the forest. Abundant nearby habitat on Hart Prairie and Kachina Peaks Wilderness exists for this species. |
| Abert squirrel | Much thinning will occur outside of habitat for this species. Thinning and burning will improve vigor of remaining trees. Scale and magnitude of this action will not influence population viability on the forest. Abundant nearby habitat on Hart Prairie and Kachina Peaks Wilderness exists for this species. | No changes to species habitat will occur. No impact to population viability on forest. | Much thinning will occur outside of habitat for this species. Thinning and burning will improve vigor of remaining trees. Scale and magnitude of this action will not influence population viability on the forest. Abundant nearby habitat on Hart Prairie and Kachina Peaks Wilderness exists for this species. |

| MIS | Alternative A | Alternative B | Alternative C |
|---------------------|--|---|--|
| Red squirrel | Much thinning will occur outside of habitat for this species. Scale and magnitude of this action will not influence population viability on the forest. Abundant nearby habitat on Hart Prairie and Kachina Peaks Wilderness exists for this species. | No changes to species habitat will occur. No impact to population viability on forest. | Same as Alternative A. |
| Hairy woodpecker | Thinning will remove potential snags, although some will be retained. Estimated that 95% of existing snags will be retained following burning. Project should retain sufficient snags to support this species. Aspens not affected. No impacts to population viability on forest expected. | No impacts to snags outside of natural events. No impacts to population viability on forest expected. | Thinning will remove potential snags, although some will be kept as snags. Estimated that 95% of existing snags will be retained following burning. Project should retain sufficient snags to support this species. Aspens not affected. No impacts to population viability on forest expected. |
| Turkey | Burning will result in temporary decrease in hiding cover for poults. Forage quantity and quality will increase following burning and thinning. No impacts to population viability on forest expected. | This area will remain high quality habitat for turkeys. No impacts to population viability on forest expected. | Burning will result in temporary decrease in hiding cover for poults. Forage quantity and quality will increase following burning and thinning. No impacts to population viability on forest expected. |
| Mexican spotted owl | See effects in above section on rare species. No impacts to population viability on forest expected. | See effects in above section on rare species. No impacts to population viability on forest expected. | See effects in above section on rare species. No impacts to population viability on forest expected. |
| Northern goshawk | See effects in above section on rare species. No impacts to population viability on forest expected. | See effects in above section on rare species. No impacts to population viability on forest expected. | See effects in above section on rare species. No impacts to population viability on forest expected.. |
| Antelope | Hart Prairie is not considered habitat for pronghorn due to the relatively high elevation, strong presence of pine, aspen and mixed conifer and highly fragmented habitat. Known herds roam in better quality habitat in Kendrick Park, @ 5 miles to the north. No impacts to population viability on forest expected. | Hart Prairie is not considered habitat for pronghorn due to the relatively high elevation, strong presence of pine, aspen and mixed conifer and highly fragmented habitat. Known herds roam in better quality habitat | Hart Prairie is not considered habitat for pronghorn due to the relatively high elevation, strong presence of pine, aspen and mixed conifer and highly fragmented habitat. Known herds roam in better quality habitat in Kendrick Park, @ 5 miles to the north. No impacts to population viability on forest expected. |

| MIS | Alternative A | Alternative B | Alternative C |
|------------|--|---|---|
| | | in Kendrick Park, @ 5 miles to the north. No impacts to population viability on forest expected. | |
| Elk | No impacts to population viability on forest expected. Timing of burning outside of calving season so no disturbance. Timing of thinning may impact calving. Burning and thinning will result in improved quantity and quality of forage. Improvement of riparian will improve habitat quality for this species. Removal of unnamed tank will remove one water source resulting in seasonal shift to others in area. Tank modification will retain water source and result in incremental improvement in habitat quality with re-establishment of original drainage. | The Bebb's Restoration project area is primarily summer range for elk, including habitat for bulls and calving. Some of the pine has progressed past early succession into higher canopy coverage which is reducing vigor and abundance of forbs, grasses and browse in some locations. Although not beneficial for elk, no impacts to population viability on forest expected. | No impacts to population viability on forest expected. Same effects as Alternative A. |

| MIS | Alternative A | Alternative B | Alternative C |
|------------|---|--|------------------------|
| Mule deer | No impacts to population viability on forest expected. Timing of burning outside of fawning season so no disturbance. Timing of thinning may impact fawning of individual deer. Excellent fawning habitat is just uphill of project area on the Peaks. Burning and thinning will result in improved quantity and quality of forage. Improvement of riparian will improve habitat quality for this species. Removal of unnamed tank will remove one water source resulting in seasonal shift to other tanks in area. Tank modification will retain water source and result in incremental improvement in habitat quality with re-establishment of original drainage. | No impacts to population viability on forest expected. | Same as Alternative A. |

Migratory Birds

Priority species by habitat (Latta et al. 1999) and recorded in the Hart Prairie area (Nature Conservancy, no date) area are:

| Bird species | Mixed conifer | Ponderosa pine | High elevation grassland | High elevation riparian |
|------------------------|----------------------|-----------------------|---------------------------------|--------------------------------|
| Northern goshawk | X | X | | |
| Mexican spotted owl | X | X | | |
| Olive-sided Flycatcher | X | X | | |
| Cordilleran flycatcher | | X | | |
| Ferruginous hawk | | | X | |
| Swainson's hawk | | | X | |

| | | | | |
|------------------------|--|--|--|---|
| MacGillivray's Warbler | | | | X |
| Red-faced Warbler | | | | X |

Affected Environment – Migratory Birds

Northern goshawks and Mexican spotted owls are described in the above section on special status species. Olive-sided flycatchers are associated with forest openings and edges with numerous dead trees and live mature pines. Cordilleran flycatchers are associated with mid to late successional stages with dense canopy closure and drainages that create a cool microclimate. Both of these species are rare cowbird hosts. Swainson's Hawks are uncommon during June, July and during migration. There is no known nesting. Ferruginous Hawks are migrants or uncommon during the winter. They feed on small mammals. Swainson's Hawks feed on small mammals, insects, lizards and birds. MacGillivray's Warblers are associated with wet meadows and edges; dense understory and shrubs at edges of conifer and deciduous forests. Ground nesting Red-warblers are tied to dense midstory, generally on steeper slopes and riparian edges.

Effects – Migratory Birds

| Bird species | Alternative A | Alternative B | Alternative C |
|------------------------|---|--|---|
| Northern goshawk | Described above | Described above | Described above |
| Mexican spotted owl | Described above | Described above | Described above |
| Olive-sided Flycatcher | Beneficial effects due to thinning & burning creating openings and more edge,;retention of snags and large trees. | Neutral effects but gradual deterioration of habitat as canopy cover increases resulting in fewer openings and less edge. | Same as Alternative A. |
| Cordilleran flycatcher | Project will create more open habitat favoring early successional birds, not mid to late successional ones like this one. Abundant habitat exists on the nearby Kachina Peaks for this species. | Neutral effects but gradual improvement of habitat as canopy cover increases resulting in mid to late successional stage, dense canopy. Drainage off Peaks is favorable for cool microclimate. | Project will create more open habitat favoring early successional birds, not mid to late successional ones like this one. Abundant habitat exists on the nearby Kachina Peaks for this species. |
| Ferruginous hawk | No direct effects due to lack of reproduction in area. Positive indirect effects to improvement of habitat for prey species due to both | Neutral effects but gradual deterioration of habitat as canopy cover increases resulting in fewer openings. | Same as Alternative A. |

| Bird species | Alternative A | Alternative B | Alternative C |
|------------------------|---|---|--|
| | thinning and burning. | | |
| Swainson's hawk | No direct effects due to lack of reproduction in area. Positive indirect effects to improvement of habitat for prey species due to both thinning and burning. | Neutral effects but gradual deterioration of habitat as canopy cover increases resulting in fewer openings. | Same as Alternative A. |
| MacGillivray's Warbler | Project favorable for this species due to expected improvement in riparian and shrub species. | Neutral effects but gradual deterioration of habitat as riparian habitat succeeds to wet meadow environment. Shrubs may be outcompeted by overstory eventually. | Same as Alternative A. |
| Red-faced Warbler | Project favorable for this species due to expected improvement in riparian and willow species. | Neutral effects but gradual deterioration of habitat as riparian habitat succeeds to wet meadow environment. Shrubs may be outcompeted by overstory eventually. | Project favorable for this species due to expected improvement in riparian and willow species. |

Cumulative effects – Migratory Birds

Grazing and fire suppression are two activities in the area that play the strongest roles in affecting habitat for these species. Although this area has not been grazed for a number of years, cattle grazing is a permitted activity. Both flycatchers are rare cowbird hosts and breeding individuals could be negatively affected by cowbird parasitism during years cattle and cowbirds are in the area. Wildlife and domestic grazing can negatively impact shrub and willow communities, reducing habitat quality for warblers. Early succession, edge and open habitat favoring species like Swainson's and Ferruginous Hawks, Olive-sided Flycatchers are negatively affected by the lack of fire. Fire functions to maintain openings and vigor and abundance of understory species. Fire would decrease competition for water in vicinity of riparian areas favoring maintenance of riparian habitat and shrubs for warblers. Late successional species like northern goshawks, Mexican spotted owls, and Cordilleran Flycatchers would respond favorably to fire suppression due to increased densities of trees and canopy cover.

AIR

Affected Environment

The resource value most affected by air pollution is visibility. The affect or potential for deterioration to visibility is from smoke and dust. The project area is located within the Verde Airshed. The Arizona Department of Environmental Quality will regulate these activities such that air quality standards will be met.

Effects

The Arizona Department of Environmental Quality (ADEQ) strictly models emissions/pollutants from all prescribed burning. Any prescribed burn planned by the forest service must be approved by ADEQ on a daily basis. ADEQ will not allow more acres burned per day, per air shed, than is acceptable with the current air quality conditions. Also, all forest burning activities are regulated and administered by Article 15, Forest and Range Management Burn Rules (10/8/96).

Smoke from prescribed burning will still have short-term impacts on local air quality. The broadcast burning of the project area will generate smoke for as long as seventy-two hours after ignition.

Following the prescribed burn of the project area, nighttime airflow will hold smoke close to the ground. Low volumes of this nocturnal smoke will be present for two or three consecutive nights.

SCENERY

Affected Environment

The scenery of Hart Prairie is highly valued by nearby private landowners and members of the public who visit the area for recreation. The project area is in the middle ground as seen from Forest Road 151 a popular road. Portions of the project area can also be seen from the Hart Prairie Preserve and other private lands. The vistas from Snowbowl ski area overlook the project area for long distances. The project area is a naturally appearing landscape with very few roads and no utility lines visible. Private houses are interspersed with public land on the north, west and south sides. The east side of the project area is the lower slopes of the San Francisco Peaks.

Effects

In the short term (approximately 2 years) red slash may be seen within the 60 acres of tree cutting treatment. Trees cut will be relatively sparse, so the resulting slash will be interspersed with grassy areas. The slash will be lopped to reduce its height. This slash will be burned along with the broadcast burn.

This project will essentially replicate natural vegetative patterns of the area by restoring meadow. The result of this activity will be subordinate to the natural landscape and therefore meets partial retention objectives as seen from Forest Road 151. In the long term the scenery will be protected and enhanced.

Attached to this document are photo simulations. They show the desired conditions the project is striving to achieve. Short duration effects, such as slash, are not shown.

CULTURAL RESOURCES

Affected Environment

The Hart Prairie area contains evidence of a variety of prehistoric and historic land uses. Prehistoric use of the area focused on seasonal hunting, gathering, and food processing activities. The presence of water probably supported a diverse vegetative and animal community, attracting people to the area to exploit these subsistence resources.

Historic uses and settlement of the area have been related to resource extraction such as, timber harvest, water harvest, and ranching and dairy farming. Tourism and scientific study have occurred extensively in this area. The physical remains of these uses and activities are evident and have undoubtedly contributed to the existing condition of the area.

The Bebb Willow Restoration project is located on the West side of the San Francisco Peaks. The San Francisco Peaks have been identified as a traditional cultural property by a number of Southwest Indian Tribes including the Hopi Tribe, the Navajo Nation, the Pueblo of Acoma, the Pueblo of Zuni, the Havasupai Tribe, the Hualapai Tribe, the Yavapai-Apache Nation, the Yavapai-Prescott Tribe, the San Carlos Apache, the White Mountain Apache, the Tonto Apache Tribe, the Fort McDowell Yavapai Nation, and the Southern San Juan Paiute. The San Francisco Peaks have been determined eligible for the National Register of Historic Places. The Hart Prairie area is used by tribes for traditional gathering of plant, animal, and mineral resources, as well as for ceremonial and other cultural uses.

Effects – Cultural Resources

Direct and indirect effects to the San Francisco Peaks through management actions under the preferred alternative include thinning and lopping and scattering slash; prescribed burning and future maintenance burning; removal of an un-named tank and reshaping the drainages; and monitoring of restoration on the watershed and riparian area. Consultations with the tribes who consider the San Francisco Peaks a traditional cultural property resulted in no specific concerns about the effect of the proposal on the San Francisco Peaks. Specific non-ground disturbing treatment measures will be allowed within an archaeological site that will contribute to the accomplishment of project objectives without impacting the site. Reduction of fuels around and within the site and future maintenance is considered beneficial.

Tribal access will not be effected by the proposed project. Effects to tribal use are expected to be temporary and short-term. Prescribed burning may enhance viability of plants that are used by Indians.

ACCESS

There is no change to the current road and trail access in the project area under any alternative.

ECONOMICS

The funding for this project was secured through a grant from the Arizona Water Protection Fund. Funding from this grant is being used by The Nature Conservancy, Northern Arizona University and the U.S. Forest Service to design, implement and monitor this project. In addition to the funding, volunteers and students have and will continue to contribute to the design and long term monitoring. Several students are working towards advanced degrees that are directly related to the restoration efforts.

It is difficult, if not impossible, to put an economic evaluation on the project, since it is designed primarily as a small-scale research restoration project. Also, it would be difficult to calculate a monetary figure for some of the rare plant communities such as the Bebb willow and scarlet gilia that should benefit from the restoration. Data gathered as a result of the monitoring of this project could have much larger implications for some of the landscape scale watersheds in the arid southwest. When the results of the treatments are analyzed, they may give a good indication of the economic viability of future watershed restoration projects in these habitats. Without the research and long term monitoring, managers in the future will continue to rely on theory and not actual results.

RECREATION OPPORTUNITY

There is no change under any alternative to recreation opportunity in the area.

ENVIRONMENTAL JUSTICE

The issue of environmental equity and justice in natural resource allocation and decision-making is receiving increasing political and social attention. Following President Clinton's Executive Order 12898 (Federal Register, February, 1994) all federal land management agencies have been mandated to address environmental justice in nonwhite and/or low-income populations, with the goal of achieving environmental protection for all communities regardless of their racial and economic composition.

None of the Alternatives result in disproportionate impacts to low-income populations, nor do they impact minority populations. There is no effect to the traditional cultural values of minority American Indian Tribes in the region.

4.0 Agencies and Individuals Consulted

Example

This Project was listed on the Coconino Schedule of Proposed Actions (SOPA) and first appeared in February 2000 and all subsequent issues. The SOPA mailing list is located in a database on the Coconino server. Mailing lists for this project follow.

First Mailing of Proposed Action (7-29-00)

Chicago Title Co., , Haleiwa, HI
 TNC, , Boulder, CO
 Lyons Trust, , Flagstaff, AZ
 Hurst Enterprises, Inc, 3, Flagstaff, AZ
 Andrew, Alan, Flagstaff, AZ
 Leslie and Howard, Anderson, Flagstaff, AZ
 J.R. Murray -, Arizona Snowbowl, Flagstaff, AZ
 Lisa, Aumack, Flagstaff, AZ
 J. R. and Myra, Babbitt, Santa Fe, NM
 Jacquita, Bailey, Flagstaff, AZ
 Thomas and Monica, Blacketer, Flagstaff, AZ
 Randy and Catherine, Boardman, Clarkdale, AZ
 Karen and Hal, Bonham, Phoenix, AZ
 Thomas Jr. and Rosemary, Bradley, Phoenix, AZ
 Norman, Brent Petit, Flagstaff, AZ
 Del, Brian, Flagstaff, AZ
 William and Karla, Bynum, Phoenix, AZ
 Les and Annette, Cherow, Phoenix, AZ
 Brian and Joyce, Childers, Tuscon, AZ
 Charles and Camille, Cimaglia, Scottsdale, AZ
 Barbara and Platt, Cline, Flagstaff, AZ
 Barbara & Platt, Cline, Flagstaff, AZ
 Judith, Conant, New York, NY
 Roy R. and Vicki L, Contreras, Oro Valley, AZ
 Anne Marie and Ronald, Cornelius, Phoenix, AZ
 Brian and Maureen, Crawford, Costa Mesa, CA
 J. Richard, Creath, Tempe, AZ
 Sandra and Jack, Creed, Glendale, AZ
 Melvin and Carmen, Curtis, Mesa, AZ
 Patrick & Joan, Cusack, Phoenix, AZ
 Louis and Susan, Daroff, Mesa, AZ
 Jeffrey and Laura, Davis, Prescott, AZ
 David and Mindy, Degraff, Flagstaff, AZ
 Donald and Karen, Denison, Sedona, AZ
 Thayer and Elizabeth, Diedrich, Fr. Worth, TX
 Patrice, John and Suzanne, Donley, Cave Creek, AZ
 Keith and Katharine, Eaton, Flagstaff, AZ
 Carol and Kent, Etter, Flagstaff, AZ
 James, Eutsey, Scottsdale, AZ
 Cynthia and Lawrence, Farrar, Phoenix, AZ
 Michael J. MD, Flores, Flagstaff, AZ

Dennis and Laura Lee, Forbes, Flagstaff, AZ
 Donna, Fosberg, Flagstaff, AZ
 Gary and Sue, Fountain, Redondo Beach, CA
 Stephen, Jr., Francois, Scottsdale, AZ
 Diane, Frazier, Flagstaff, AZ
 Flagstaff Unified School District, FUSD, Flagstaff, AZ
 Flagstaff Unified School District, FUSD, Flagstaff, AZ
 Paul, Garvison, Scottsdale, AZ
 John and Virginia, Giovale, Flagstaff, AZ
 Thomas and Rebecca, Glenn, Phoenix, AZ
 Andrew and Janell, Grannan, Flagstaff, AZ
 Raymond and Elizabeth, Graves, Scottsdale, AZ
 Hermine, Greenberg, Phoenix, AZ
 John and Sheryl, Harrison, Glendale, AZ
 Mark R., Harvey, Flagstaff, AZ
 Dayle and Cherie, Henson, Flagstaff, AZ
 John and Rebecca, Hildebrand, Flagstaff, AZ
 Kristian and Sandra, Hvidberg, Phoenix, AZ
 Kenneth and Keen, Jacobs, Flagstaff, AZ
 Billie, Mark and Michael, Jacobs, Flagstaff, AZ
 Robert, Jensen, Flagstaff, AZ
 Kay and Chester, Johns, Scottsdale, AZ
 Kay & Chester, Johns, Scottsdale, AZ
 Denise & MacKenzie, Kalt, Phoenix, AZ
 Donald and Ruby, Kelsey, Flagstaff, AZ
 Marion and David, Kendall, Phoenix, AZ
 Shirley and Jerry, Kinney, Phoenix, AZ
 Angelo and Kimberly, Kokenakis, Flagstaff, AZ
 Leonard and Beverly, Kopecky, Glendale, AZ
 Roseanne and Nick, Labarbera, Sedona, AZ
 Richard, Lane, Prescott, AZ
 George and Helen, Lather, Huron, SD
 Jean and John, Lea, Mesa, AZ
 John, Ledington, Flagstaff, AZ
 Anne, Leibson, Phoenix, AZ
 Richard and Nancy, Llanes, Phoenix, AZ
 HP Horny Toads, LLC, Flagstaff, AZ
 Harold and Penelope, Loyer, San Francisco, CA
 Susan, Markl, Phoenix, AZ
 David and Terri, Marsh, Cave Creek, AZ
 Doris, Masters, Scottsdale, AZ
 Doris and Robert, Masters, Scottsdale, AZ
 Doris, Masters, Scottsdale, AZ
 Gwen, McCaleb, Phoenix, AZ
 William and Maureen, McCauley, Flagstaff, AZ

Robert and Barbara, McClure, Alta Loma, CA
 Gerald and Constance, McCollow, Tucson, AZ
 David, McCormack, Flagstaff, AZ
 Jay, McCormick, Flagstaff, AZ
 Jack and Claire, McCracken, Flagstaff, AZ
 Cheri, McCracken, Phoenix, AZ
 Family, McCullough, Flagstaff, AZ
 Thomas, McCullough, Flagstaff, AZ
 Ira and Doris, Merrill, Tempe, AZ
 Ann, Michelbach, Flagstaff, AZ
 Robert and Penne, Miller, Flagstaff, AZ
 Neil and Laura, Mogk, Flagstaff, AZ
 Jill and Robert, Morari, Glendale, AZ
 Rita, Munn, Phoenix, AZ
 Gwenn, Murie, Nutrioso, AZ
 Larry and Margo, Newhouse, Phoenix, AZ
 James and Susan, Padavano, Carefree, AZ
 Lawrence, Pavilack, Scottsdale, AZ
 Phillip, Pepe, Cave Creek, AZ
 David and Jean, Pettitt, Santa Barbara, CA
 Barbara, Pisel, Payson, AZ
 Glen and Sharon, Pittard, Chandler, AZ
 Walter and Patricia, Pyle, Phoenix, AZ
 James, Ray, Redlands, CA
 Carolyn, Refsnes, Phoenix, AZ
 Joseph and Earlene, Refsnes, Phoenix, AZ
 Joseph and Earlene, Refsnes, Phoenix, AZ
 Juanita, Ritland, Flagstaff, AZ
 Michael and Verla, Robert, Phoenix, AZ
 Russell and Imogene, Roddy, Flagstaff, AZ
 Bobby, Ryan, Carefree, AZ
 Barry & Janice, Schader, Phoenix, AZ
 Barry & Janice, Schader, Phoenix, AZ
 John and Mary, Scillieri, Flagstaff, AZ
 John and Marie, Sellers, Chandler, AZ
 Jonathan, Senn, Tucson, AZ
 James and Latisha, Smidt, Phoenix, AZ
 Edward, Smith, Flagstaff, AZ
 Alice, Smith, Phoenix, AZ
 Edward, Smith, Flagstaff, AZ
 Solitude Ski Resort, Solitude Ski Resort, Sandy, UT
 David, Sparks, Phoenix, AZ
 James Evan, Spencer, Flagstaff, AZ
 Jack, Stryker, Flagstaff, AZ
 Armilda, Swanson, Mesa, AZ
 Charles and Gretchen, Swartwout, Sedona, AZ
 Al, Tellis, Flagstaff, AZ
 Gary and Claire, Thompson, Casa Grande, AZ
 John and Deb, Trebon, Flagstaff, AZ
 Joseph, Tusa, Tempe, AZ
 Lester and Nancy, U'ren, Phoenix, AZ
 Diana and Brent, Upson, Glendale, AZ
 Betty W. Trustee, Vandenburg, Phoenix, AZ
 Christy, Vanier, Scottsdale, AZ
 Jene Kenneth, Vredevoord, Flagstaff, AZ

Pamela and Michael, Walbom, Tucson, AZ
 W Dave & Christine, Wald-Hopkins, Tucson, AZ
 Helen, Weidner, Sedona, AZ
 Charles B., Wheeler, Scottsdale, AZ
 Stephanie, White, Flagstaff, AZ
 Christopher and Pamela, Wilkum, Cave Creek, AZ
 Dick and Jean, Wilson, Flagstaff, AZ
 Kenneth W., Wright, Oro Valley, AZ
 ADEQ – Flagstaff, AZ
 AZ Snowbowl, Flagstaff, AZ
 Coconino County Board of Supervisors
 Flagstaff Chamber of Commerce
 NAU Library
 Navajo Tribe Peaks Range Allotment, Window Rock, AZ
 Rocky Mountain Research Station – Flagstaff, AZ
 Brad Ack, Grand Canyon Trust
 Vickie Amabisca, Flagstaff, AZ
 Don Arganbright, NAU School of Forestry,
 Wally Convington, NAU School of Forestry
 Marylou Fairweather, Flagstaff, AZ
 Larry Flatau, Army Corps of Engineers, Phoenix AZ
 Gary Hase Jr, AZ State Land Department, Flagstaff, AZ
 Nan Johnson, Flagstaff, AZ
 Peter Lahm, ADEQ/Forest Service, Phoenix, AZ
 Lally McMahon, Forest Guardian, Santa Fe, NM
 Debbie Noel, Arizona Game and Fish Department,
 Flagstaff, AZ
 Brian Segee, SW Center for Biodiversity, Fucson, AZ
 Shelly Silbert, TNC, Flagstaff, AZ
 Edward Smith, Flagstaff, AZ
 Paul Summerfelt, City of Flagstaff Fire Department

Second Mailing of Proposed Action (9-5-00)

List of names for the second mailing of the PA

Howard & Ann, Klapman, Glenview, IL
 Birgit, Wyss, Flagstaff, AZ
 Helen, Weidner, Phoenix, AZ
 Rule, Gould, Cave Creek, AZ
 Lisa, Aumack, Flagstaff, AZ
 Michael & Pensch, Flores, Flagstaff, AZ
 Howard, Lyons, Flagstaff, AZ
 Denise, Gould, Clarkdale, AZ
 Rose Ann, Dee Trustee, Phoenix, AZ
 Hart Prairie Horney Toads, Flagstaff, AZ
 David & Robert Crane, Taylor, Flagstaff, AZ
 Dave & Christine, Wald-Hopkins, Tucson, AZ
 Vern, Haugen, Scottsdale, AZ
 Jeffrey & Laura, Davis, Prescott, AZ
 Kathleen Ann, Zimski, Flagstaff, AZ
 Beamer Brothers, Flagstaff, AZ
 Phillip J, Pepe, Cave Creek, AZ
 Bobby & Leslie, Ryan, Carefree, AZ

Christy, Vanier, Scottsdale, Az

EA Mailing List (3-6-01)

Eathan Aumack, Grand Canyon Trust, Flagstaff, AZ

LJCherow, Phoenix AZ

Donald and Karen Denison, Sedona AZ

Dr. Laura Dewald, Flagstaff, AZ

Keith and Kathy Eaton, Flagstaff AZ

Pete Fule, Flagstaff AZ

Gloria Hardwick, Flagstaff, AZ

Vern Haugen, Scottsdale, AZ

Cameron Kern, Flagstaff, AZ

Angelo Kokenakis, Flagstaff AZ

Cindy Lester, Phoenix AZ

Tom Matthews, Phoenix AZ

Gerald McCollow, Tucson, AZ

Lally McMahon, Santa Fe NM

Larry Newhouse, Phoenix AZ

Lars Ortegren, Forest Guardians, Santa Fe, NM

James and susan Padavano, Carefree AZ

Michael Robert, Phoenix AZ

Brian Segee, Center for BioDiversity, Tucson AZ

Ron Seig, AZ Game and Fish Department

Shelly Silbert, Nature Conservancy, Flagstaff, AZ

David Van Denburgh, Phoenix AZ

Lori and Church Wheeler, Scottsdale AZ

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<http://www.fs.fed.us/database/feis>

Proposed treatment area of Hart Prairie



Simulated appearance of Hart Prairie following treatment

